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WILDLIFE REVIEW

AN ABSTRACTING SERVICE FOR WILDLIFE MANAGEMENT
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UNITED STATES DEPARTMENT OF THE INTERIOR

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Washington, D. C. No. 31 June, 1941

Classification: Deer, Black-tailed

Longhurst, Wm. M., and John E. Chattin. The burro deer Odocoileus hemionus eremicus, California Fish and Game (Terminal Island, Calif.), 27(1), Jan. 1941, pp. 2-12, 3 figs., 1 table.

This deer inhabits only the lower Colorado River region in the United States. On a hunt to collect specimens for comparative purposes, observations were made on its habits; its chief food at the time was a grass (Hilaria rigida). Comparisons are made in text, table, and figures, of charactors of this and 5 other subspecies.

Conservation: Bird protection

Collinge, Walter E. Weather, wild birds, and home-grown food, Nature (Macmillan & Co., St. Martin's St., London, W.C. 2, England. One shilling a copy), 147(3722), March 1, 1941, pp. 267-268.

Calls attention to reduction in birds generally by severe winters, the latest of which was that of 1939-40. Based on experience in 1918, the writer predicts increased damage by insects and rodents, and suggests prohibition of the taking of any wild birds or their eggs (house sparrow, starling, and wood pigeon, excepted) until the end of 1942.

Conservation: Pan-American

National Parks Bulletin

Colom, Jose L. Pan American policy for nature protection/(1624 H St. N.W., Washington, D. C.), 15(69), Feb. 1941, pp. 5-13, 10 photos, 1 map.

This article relates to the convention referred to in WILDLIFE REVIEW, No. 29, January 1941, pp. 54-55. The convention is reproduced in full and comment upon it is quoted from Hector Castro, Minister of El Salvador, and from Newton B. Drury, Ira N. Gabrielson, and C. E. Rachford, heads of Usonian Federal conservation organizations. The author traces the history of the agreement that has now been signed by plenipotentiaries of 15 countries. While lack of organizations to enforce conservation and the difficulties of the present international situation may postpone realization of the benefits sought by the treaty, the author believes that Pan American conservation is definitely on its way and that satisfactory results will in time be attained.

Control: Hare, Snowshoe

Deerwester, Therman. Cooperative snowshoe hare control project, Wisconsin Conservation Bulletin (Wisconsin Conservation Department, Madison), 6(4), April 1941, pp. 19-20.

The Forest Service, Biological Survey, and State Conservation Department were the original cooperators on work begun in 1938 to control damage to planted evergreens. Destruction varies with the cyclic abundance of the hare and is serious during the latter half of the upswing. Use of a sprayed-on

repellent, while effective, was impracticable because of the expense involved in renewing the application annually. Of aggressive measures, snaring proved both effective and economical. Hare control may serve to assist in moderating the cycle and providing a more constant population for greater lengths of time.

Destruction: Highway mortality

Hein, Edward N. Gunless killing, Wisconsin Conservation Bulletin (Wisconsin Conservation Dept., Madison), 6(2), Feb. 1941, pp. 24-26, 1 table.

Number of animals, including domesticated kinds, killed on two highways in 12 and 10 months, respectively. In both instances, rabbits furnished the greatest number of victims.

Destruction: Highway mortality

Stoner, Dayton. Bird casualties on the highways, University of the State of New York (Albany), Bul. 27(7), March 1941, pp. 229-232, 1 photo.

Mainly notes on animals seen dead along highways in four round trips from Albany, N. Y., to Iowa City, Iowa. Birds totalled 1,781 out of 2,975 freshly killed vertebrates. Suggestions are made as to use of some of the victims for biological specimens.

Destruction: Pheasants by winter storms

Carlson, C. Edward. Pheasants and the past winter, Conservation Volunteer (Minnesota Department of Conservation, St. Paul), 2(9), June 1941, pp. 47-50.

Description of two unprecedented storms and of the destruction they caused among pheasants. On one census area the birds were reduced from 50 to 29 per square mile. Despite this loss, the number of pheasants going into the nesting season compares favorably with that of 1939 which proved to be a successful hunting year.

Destruction: Waterfowl

Rysgaard, G. N. A short history of waterfowl, Conservation Volunteer (Minnesota Department of Conservation, St. Paul), 2(9), June 1941, pp. 75-79.

Effects of drainage, drought, botulism, lead poisoning, and shooting, as affecting the total, and the Minnesota, populations. A low was reached in 1935. There has been some increase but at the rate of a 5 percent annual increase, it would require 14 years to restore the population to 50,000,000 birds, one-half of that of 1930, which was considered dangerously low.

Diseases and Parasites: Acanthocephala, Centrorhynchus

Van Cleave, Harley J., and Edna M. Pratt. A new species of the genus Centrorhynchus (Acanthocephala) from the barred owl, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(4), Aug. 1940, pp. 297-300, 1 pl.

C. conspectus n. sp., North Carolina, described and illustrated. Key to 3 N. A. species of the genus. Bibliography of 6 titles.

Diseases and Parasites: Acarina, Entonyssus

Schmidt, Fred L. Entonyssus vitzthumi (Acarina), a new ophidian lung mite, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(4), Aug. 1940, pp. 309-313, 1 pl.

From a bull snake, Oklahoma; description; illustration. Bibliography of 8 titles.

Diseases and Parasites: Acarina, Ornithodoros

Cooley, R. A., and Glen M. Kohls. Three new species of Ornithodoros (Acarina: Ixodoidea), U. S. Public Health Reports (Supt. of Documents, Washington, D. C. 5 cents a copy), 56(12), March 21, 1941, pp. 587-594, 2 pls., 2 figs.

O. oromicus from Peromyscus maniculatus, Utah; and O. stageri and O. yumatensis from bat caves in southwestern States.

Diseases and Parasites: Acarina, Ornithodoros

Cooley, R. A., and Glen M. Kohls. Further new species of Ornithodoros from bats (Acarina: Argasidae), U. S. Public Health Reports (Supt. of Documents, Washington, D. C. 5 cents a copy), 56(17), April 25, 1941, pp. 910-914, 1 pl., 3 figs.

O. concanensis, Texas and Arizona; O. kelleyi, Utah and Colorado.

Diseases and Parasites: Blood parasites

Nelson, E. Clifford, and Jay S. Gashwiler. Blood parasites of some Maine waterfowl, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 199-205, 2 tables.

Authors' abstract: "The major objective of this survey was a study of the prevalence of Leucocytozoon. Blood smears were obtained from waterfowl live-trapped during banding operations. In all, smears were obtained from 130 individuals of nine species. Leucocytozoon was found in 59% of 77 wood ducks and 89% of 29 black ducks. These birds came from the same area so perhaps black ducks are more prone to infection than wood ducks. No birds under

two weeks of age were found infected but all of the ducklings from three to seven weeks of age were infected. Additions to the list of hosts recorded for Leucocytozoon are the wood duck, American merganser, hooded merganser, American goldon-eye, and green-winged teal. Haemoproteus was found in 64% of 77 wood ducks and 20% of 29 black ducks which may indicate that wood ducks are more prone to this infection. Haemoproteus was also found in ring-necked ducks and coots. Ring-necked ducks, wood ducks, and coots are additions to known hosts of this parasite. Microfilaria was found in 38% of the wood ducks and 31% of the black ducks, one of six ring-neck ducks, one of three hooded mergansers, one green-winged teal, and one of two coots. Three different types of microfilariae were found. The adult worms were not collected. No parasites were found in two lesser scaups. Bibliography of 11 titles.

Diseases and Parasites: Cestoda

Hughes, R. Chester, John R. Baker, and C. Benton Dawson. The tapeworms of reptiles. Part 1. American Midland Naturalist (Notre Dame, Ind. $1.00 a copy), 25(2), March 1941, pp. 454-468.

Key to the principal taxonomic groups and synonymic catalog of the species with host and locality records.

Diseases and Parasites: Cestoda, Tatria

Schultz, Richard L. Some observations on the amabiliid cestode, Tatria duodecacantha Olsen, 1939, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(2), April 1940, pp. 101-103, 1 pl.

Pied-billed grebe, Oklahoma. Key to 5 species of Tatria, that mentioned in title illustrated by 7 figures. Bibliography of 5 titles.

Diseases and Parasites: Diptera, Cuterebra

Knipling, E. F., and A. L. Brody. Some taxonomic characters of cuterebrine (Diptera) larvae, with larval descriptions of two species from Georgia, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(1), Feb. 1940, pp. 33-43, 2 pls.

Life history and habits; larval structure described and illustrated for Cuterebra buccata from the cottontail, and C. cuniculi from the marsh rabbit.

Diseases and Parasites: Encephalomyelitis

Beaudette, F. R., J. J. Black, and C. B. Hudson. Another case of equine encephalomyelitis in New Jersey pheasants, Journ. Amer. Veterinary Med. Assoc. (600 S. Michigan Ave., Chicago, Ill. 75 cents a copy), 98(771), June 1941, pp. 449-451, 1 fig., 1 table.

In captive birds: lesions, history of outbreak, comment on possible sources of infection.

Diseases and Parasites: Encephalomyelitis

Sellards, Andrew W., Ernest E. Tyzzer, and Byron L. Bennett. The infection of birds with the virus of equine encephalomyelitis, Amer. Journ. Hygiene (Prince and Lemon Sts., Lancaster, Pa. $1.00 a copy of a single section), 33(2), March, Section B, pp. 63-68.

Authors' summary: "The virus of equine encephalomyelitis recovered from pheasants dying in Connecticut was found to conform in its various characteristics with an eastern equine strain without evidence of any peculiarities attributable to its avian origin. A fatal paralysis developed in several adult pheasants after intramuscular injection. Very young chicks died within 48 hours after subcutaneous injection; young hens remained free of symptoms even after intracerebral inoculation but their serum developed protective properties." Bibliography of 15 titles.

Diseases and Parasites: Encephalomyelitis

Syverton, Jerome T., and George P. Berry. The transmission of equine encephalomyelitis to the western burrowing owl, Spootyto cunicularia hypugaea (Bonaparte), Amer. Journ. Hygiene (Prince and Lemon Sts., Lancaster, Pa. $1.00 a copy of a single section), 33(2), March, Section B, pp. 37-41, 1 chart, 1 table.

Experimentally susceptible; the paper contains references to findings with respect to numerous other birds and mammals. Bibliography of 18 titles.

Diseases and Parasites: Helminths of Australia

Young, May R. Helminth parasites of Australia, Imperial Bureau of Agricultural Parasitology (St. Albans, England. 10 shillings, 6 pence a copy), 145 pp., 1939.

Bibliography, host index, catalogue of parasites, and also a list of free-living nematodes.

Diseases and Parasites: Lead poisoning

Nord, Warren H. A technique for removing lead from the gizzards of living waterfowl, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 175-179, 1 pl., 1 fig.

Author's abstract: "An apparatus utilizing vacuum for the removal of lead shot from the proventriculus and gizzard of living waterfowl is described. Water is the transporting medium administered by a tube surrounding the suction or vacuum tube which is inserted through the oral opening into the gizzard. Debris and shot are collected in a vacuum reservoir. As high as 26 shot have been removed from a single mallard. Proper food and shelter following shot removal are recommended, and use of the apparatus for food preference collections is suggested."

Diseases and Parasites: Myiasis

McLean, Donald D. The screw-worm fly, California Conservationist (306 State Office Bldg., Sacramento, Calif. 15 cents a copy), 6(2), Feb. 1941, pp. 11, 20, 21.

Description of stages of this dipteron; range of infestation; species infected (several wild); notes on cases of deer infestation; 190 head of deer known to have died from myiasis in a year.

Diseases and Parasites: Nematoda

Reelfoot Lake, Tennessee,

Reiber, Robert J. Nematodes of amphibia and reptilia. I./ Rep. Reelfoot Lake Biol. Sta. (Tennessee Academy of Science, Nashville), 5, Jan. 1941, pp. 92-99.

Annotated list of 14 species, with host index and bibliography of 14 titles.

Diseases and Parasites: Nematoda

Walton, A. C. Amphibian nematodes from the Gaspe Peninsula and vicinity, Journ. Parasitology (Science Press, Lancaster, Pa. $1.50 a copy), 27(1), Feb. 1941, pp. 59-61, 1 fig.

Host records for 7 species of which one, Spironoura rankini from Rana clamitans, is described as new and illustrated.

Diseases and Parasites: Nematoda, Ascaridia

Wehr, Everett E. A new intestinal roundworm from the ruffed grouse (Bonasa umbellus) in the United States, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(5), Oct. 1940, pp. 373-376, 1 pl.

Ascaridia bonasae n. sp., northeastern States and Canada; description, illustration; key to 3 species; bibliography of 12 titles.

Diseases and Parasites: Nematoda, Lungworms in deer

Goble, Frans Cleon. Tissue changes in white-tailed deer (Odocoileus virginianus borealis) accompanying natural infections of lungworms (Genera Protostrongylus and Dictyocaulus), Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 141-158, Pls. 9-14.

Author's abstract: "Microscopic studies were made of tissues of 20 northern white-tailed deer, 14 of which had natural lungworm infections. Changes attributable to Dictyocaulus infestation were due chiefly to the presence of adults in the bronchi while Protostrongylus coburni infestation resulted in changes due to the presence of eggs and newly hatched larvae in

the alveoli. Extensive lymphocytic reaction to the latter is accompanied by atalectasis and interstitial pneumonia. Fourth stage larvae of Protostrongylus may be trapped as they arrive in the lung via the blood and embolized. They are encircled by eosinophiles and agranulocytes to form nodular lesions that are walled-off and may eventually scar or calcify. This prevents completion of the life cycle and suggests a possible mechanism of immunity. The relationships between the various factors implicated in winter losses of deer, i.e. lungworms, bacteria, malnutrition, and exposure, are discussed in the light of the histopathological findings." Bibliography of 32 titles.

Diseases and Parasites: Nematoda, Onchocerca

Annereaux, R. F. A new record of a deer parasite for California, Amer. Journ. Veterinary Research (600 S. Michigan Ave., Chicago, Ill. $1.25 a copy), 2(3), April 1941, pp. 199-201, 1 pl.

List of cattle and sheep parasites that have been reported from deer. Description and illustration of Onchocerca cervipedis, a nematode that may cause lameness in deer.

Diseases and Parasites: Nematoda, Oswaldocruzia

Walton, A. C. Oswaldocruzia minuta n. sp. (Nematoda) from Acris gryllus, Amer. Midland Naturalist (Notre Dame, Ind. $1.00 a copy), 25(2), March 1941, pp. 418-419, 3 figs.

Description, measurements, illustrations, comparative notes. Indiana.

Diseases and Parasites: Plague

Anon. Plague infection reported in the United States during 1940, U. S. Public Health Reports (Supt. of Documents, Washington, D. C. 5 cents a copy), 56(9), Feb. 28, 1941, pp. 399-400, 1 table.

Reported from 5 western States; found for the first time in Park County, Wyoming. The tabulation of 17 records shows locality, date, and species of rodents involved.

Diseases and Parasites: Plague

Eskey, C. R., and V. H. Haas. Plague in the western part of the United States, U. S. Public Health Bul. 254 (Supt. of Documents, Washington, D. C. 20 cents a copy), v+83 pp., 61 figs., 28 tables, 1940.

The first case of human plague in the United States was reported at San Francisco in 1900. Within a few years, ground squirrels of the vicinity were infected. Despite attempts at eradication, the disease persists among rodents in the vicinity of San Francisco Bay and has spread rather generally over the western States. Ground squirrels, wood rats, and prairie dogs appear to be the groups chiefly responsible for the maintenance and extension of plague. Details are given of rodent infestations. Flea investigations and

demonstration of plague infection by inoculation of parasites also are fully treated.

Diseases and Parasites: Protozoa

Coatney, G. Robert, and Wm. L. Jellison. Some blood parasites from Montana birds, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(2), April 1940, pp. 158-160, 1 table.

Occurrence of Haemoproteus, Leucocytozoon, Plasmodium, and Microfilaria in the magpie, crow, Swainson's hawk, and great horned owl.

Diseases and Parasites: Protozoa

Hewitt, Rodginal. Haemoproteus metchnikovi (Simond, 1901) from the yellow-bellied terrapin (Pseudemys elegans), Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(4), Aug. 1940, pp. 273-278, 1 pl., 1 table.

Maryland. Description, illustration, discussion and tabulation of related blood parasites from turtles of the world. Bibliography of 7 titles.

Diseases and Parasites: Protozoa, Copramoeba

Lobeck, Elizabeth A. Entamoeba pyrrhogaster n. sp., with notes on other intestinal amoebae from salamanders, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(4), Aug. 1940, pp. 243-272, 6 pls.

The only matter wholly applicable to the United States is an informal (but probably valid) description of Copramoeba salamandrae as a new species from the newt (Triturus viridescens) from Massachusetts. Bibliography of 23 titles.

Diseases and Parasites: Protozoa, Trichomonas

Levine, Norman D., L. E. Boley, and H. R. Hester. Experimental transmission of Trichomonas gallinae from the chicken to other birds, Amer. Journ. Hygiene (Prince and Lemon Sts., Lancaster, Pa. $1.00 a copy of a single section), 33(1), Jan. 1941, Section C, pp. 23-32, Pl. 1.

Authors' summary: "(1) Trichomonas from the upper digestive tract of the chicken has been transmitted by feeding cultures of the protozoon to the turkey, bobwhite quail, canary, and English sparrow. In these birds characteristic lesions were produced; (2) a light infection without lesions was similarly produced in one out of eleven ducklings; (3) an unsuccessful attempt was made to infect two ring-neck pheasants and a starling by feeding cultures of the Trichomonas; (4) in view of the similarity of morphology in a variety of natural hosts and ease of transmission from one natural host to any other and to many species of birds in which natural infections have not been found, it

is apparent that all the trichomonads so far reported from the upper digestive tract of birds belong to a single species, Trichomonas gallinae." Bibliography of 46 titles.

Diseases and Parasites: Siphonaptera

Fox, Irving. Siphonaptera from western United States, Journ. Washington Acad. Sci. (W. W. Diehl, U. S. Bureau of Plant Industry, Washington, D. C. 50 cents a copy), 30(6), June 1940, pp. 272-276, 1 pl.

Description and illustration of 3 new species of fleas from rodents, one representing a new subgenus. Corypsylloides spinata, meadow mouse, Oregon; Amphipsylla [illegible]eotomae, wood rat, California; Dactylopsylla (Spicata) rara, pocket gopher, Colorado.

Diseases and Parasites: Siphonaptera

Freeman, R. B. The distribution of Orchopeas wickhami (Baker) (Siphonaptera), in relation to its host the American grey squirrel, Entomologist's Monthly Magazine (N. Lloyd & Co. Ltd., Burrell Street Works, Blackfriars, London, S.E. 1, England. 2 shillings a copy), 77(4), April 1941, pp. 82-89, 1 pl. (map), 1 table.

Author's summary: "The flea O. wickhami Baker was first recognized in Britain in 1924. It is more or less specific to the American grey squirrel (Sciurus carolinensis Gmelin). A list of the known records is given. Introduced with the squirrel at Woburn, Beds., in 1890 and probably with other American introductions, it has been found in several isolated centres to which the squirrel has been taken from these original colonies. In certain areas it has not been found, though looked for, and such absence may be attributed to absence from the original squirrel stocks from which these areas have been colonized rather than to any physical factors making such areas unsuitable. The percentages of infestation and flea index for all species of fleas are related to the breeding cycle of the squirrel. The grey squirrel is also parasitized by Monopsyllus sciurorum (Schrank), the usual flea of the indigenous red squirrel (S. vulgaris L.) and several bird and mammal fleas; these are often found whether O. wickhami is present or not. A list of such records is given." Bibliography of 20 titles.

Diseases and Parasites: Siphonaptera

Kohls, Glen M. Siphonaptera. A study of the species infesting wild hares and rabbits of North America north of Mexico, U. S. Public Health Service, Bul. 175 (Supt. of Documents, Washington, D. C. 20 cents a copy), 26 pp., 3 pls., 8 maps, 1940.

Key to the families, genera, species and subspecies of fleas known from nearctic hares and rabbits; with text giving their synonymy, distribution, and host records; and illustrations of flea characters and maps outlining the ranges of the hosts and these parasites. Two-page bibliography.

Diseases and Parasites: Trematoda

Parker, Malcolm V. The trematode parasites from a collection of amphibians and reptiles, Rep. Reelfoot Lake Biol. Sta. (Tennessee Academy of Science, Nashville), 5, Jan. 1941, pp. 27-41, 1 pl.

Report on studies of collections from Tennessee, Georgia, and Florida. The material included "six families, seven subfamilies, 17 genera, and 36 species of digenetic trematodes, of which the following six species are considered new to science: (1) Ophioxenos singularis, (2) Lechriorchis insignis, (3) Neoronifer olaphis, (4) Paralechriorchis syntomenteroides, (5) Cercorchis reelfooti, and (6) Stomatrema faranciae. Twelve of the host records represent species reported for the second time in the literature. Approximately 24 new host records are given for various species of flukes. On the basis of the shape of the excretory bladder, the genus Stomatrema has been placed provisionally in the family Haplometridae McMullen, 1937, while the genus Cercorchis is retained in the family Roniferidae Baer, 1924. The status of the family Brachycoeliidae S. J. Johnston, 1912, remains doubtful, but the family is retained pending more definite information. The evidence found in the present study is opposed to any attempt to synonymize the various North American species of Brachycoelium." Bibliography of 29 titles.

Diseases and Parasites: Trematoda, Acanthatrium

Macy, Ralph W. Description of three new trematodes with notes on other species of Acanthatrium (Lecithodendriidae), and a key to the genus, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(4), Aug. 1940, pp. 279-286, 2 pls., 1 fig.

Key to 8 species; 3 from bats of the United States described as new. Bibliography of 7 titles.

Diseases and Parasites: Trematoda, Euparyphium

Beaver, Paul C. Studies on the life history of Euparyphium melis (Trematoda: Echinostomidae), Journ. Parasitology (Science Press, Lancaster, Pa. $1.50 a copy), 27(1), Feb. 1941, pp. 35-44, Pl. 44.

Description and illustration of the stages of this parasite, the adult of which has been recorded from the mink. Bibliography of 13 titles.

Diseases and Parasites: Trematoda, Leptophyllinae

Byrd, Elon E., Malcolm V. Parker, and Robert J. Reiber. A new genus and two new species of digenetic trematodes, with a discussion on the systematics of these and certain related forms, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(2), April 1940, pp. 111-122, 1 pl.

Paurophyllum new genus, P. simplexus n. sp., genotype, from the Florida king snake; and P. mogametricus n. sp., from the cottonmouth, both from

Florida, described and illustrated. Discussion of the genus Leptophyllum and proposal of a subfamily Leptophyllinae to contain it and the new genus. Bibliography of 14 titles.

Diseases and Parasites: Trematoda, Myotitrema

Macy, Ralph W. A new trematode, Myotitrema asymmetrica, n.g., n. sp. (Lecithodendriidae) from the little brown bat, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(1), Feb. 1940, pp. 83-84, 1 fig.

Minnesota. Bibliography of 5 titles.

Diseases and Parasites: Trematoda, Reniferidae

Wharton, G. W. The genera Telorchis, Protenes, and Auristomum (Trematoda: Reniferidae), Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(6), Dec. 1940, pp. 497-518, 1 pl., 3 tables.

Diagnoses and revisions, illustrated; key to 30 species of Telorchis and synopsis giving synonyms, descriptive notes, names of hosts (reptiles and amphibians). Each of the other genera is held to contain only a single species. Two-page bibliography.

Diseases and Parasites: Trematoda, Rhytidodoides

Smith, G. M., C. W. Coates, and R. F. Nigrelli. A papillomatous disease of the gallbladder associated with infection by flukes, occurring in the marine turtle, Chelonia mydas (Linnaeus), Zoologica (New York Zoological Society, 630 Fifth Ave., New York), 26, 1(5), May 1941, pp. 13-16, 4 pls., 1 fig.

Notes on other flukes of this and related turtles; description and illustrations of Rhytidodoides similis and the lesions it causes.

Diseases and Parasites: Trematoda, Spirorchis

Wall, Limas D. Life history of Spirorchis elephantis (Cont. 1917), a new blood fluke from Chrysemys picta, Amer. Midland Naturalist (Notre Dame, Ind. $1.00 a copy), 25(2), March 1941, pp. 402-412, 1 pl.

Diagnosis, measurements, illustrations; description of the stages; intermediate hosts, snails of the genus Helisoma; life history. Michigan. Bibliography of 11 titles.

Diseases and Parasites: Trematoda, Strigeidae

Olivier, Louis. Life history studies on two strigeid trematodes of the Douglas Lake region, Michigan, Journ. Parasitology (Rockefeller Institute, Princeton, N. J. $1.50 a copy), 26(6), Dec. 1940, pp. 447-477, 3 pls.

Species infesting tadpoles and domestic pigeons; 3-1/2-page bibliography.

Diseases and Parasites: Trypanosomiasis

Culbertson, James T. Trypanosomiasis in the Florida cotton rat, Sigmodon hispidus littoralis, Journ. Parasitology (Science Press, Lancaster, Pa. $1.50 a copy), 27(1), Feb. 1941, pp. 45-52, 4 tables.

Trypanosoma sigmodoni n. sp., described from an apparently natural infection that was found in 18 of 90 Florida cotton rats. Artificial infections are readily accomplished. Recovered individuals are immune to reinfection. Reaction of the cotton rat to other trypanosomes is recorded.

Diseases and Parasites: Of crow

Morgan, B. B., and E. F. Waller. Some parasites of the eastern crow (Corvus brachyrhynchos brachyrhynchos Brehm), Bird-Banding (Charles B. Floyd, 210 South St., Boston, Mass. 75 cents a copy), 12(1), Jan. 1941, pp. 16-22.

Report based on autopsies of 112 crows from Wisconsin and Iowa; the number parasitized and the percentage of incidence of 15 groups of parasites are tabulated, and the findings further elaborated in text. There is a paragraph also on crow food. Bibliography of 32 titles.

Diseases and Parasites: Of game birds

Madsen, Holger. The occurrence of helminths and coccidia in partridges and pheasants in Denmark, Journ. Parasitology (Science Press, Lancaster, Pa. $1.50 a copy), 27(1), Feb. 1941, pp. 29-34, 1 table.

More than 200 of each species were examined; the material and methods are described, and the results summarized, tabulated, and discussed. From author's summary: "In addition to coccidia, there were found an echinostome, cestodes, an acanthocephalan and nine species of nematodes. The echinostome, apparently Echinostoma revolutum, has not heretofore been reported from pheasants. The appearance of Dispharynx spiralis in partridges seems to be a new European host record. Capillaria columbae from partridges and C. collaris from pheasants are new host records for these parasites." Bibliography of 10 titles.

Diseases and Parasites: Of grouse

Morgan, B. B., and F. N. Hamerstrom, Jr. Notes on the endoparasites of Wisconsin pinnated and sharp-tailed grouse, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 194-198, 3 tables.

Authors' abstract: "One hundred and twenty-six sharp-tailed grouse (Pediocetes phasianellus campestris) and 52 prairie chickens (Tympanuchus cupido americanus) were examined for endoparasites. Nematodes found in prairie chickens included Seurocyrnea colini (gizzard), Heterakis gallinae (ceca), Capillaria contorta (crop), Capillaria sp. (crop), and Ascaridia lineata (small intestine). Nematodes found in sharptails included the above mentioned parasites and in addition Cheilospirura spinosa (gizzard) and Subulura strongylina (ceca). Tapeworms recorded in this survey from prairie chickens and sharptails were Rhabdometra nullicollis and Choanotaenia infundibulum. Several species of coccidia were found in feces of both birds." Bibliography of 9 titles.

Diseases and Parasites: Of gull, herring

Aldous, Clarence M. Report on a wholesale die-off of young herring gulls, Hogback Island, Moosehead Lake, Maine, Bird-Banding (Charles B. Floyd, 210 South St., Boston, Mass. 75 cents a copy), 12(1), Jan. 1941, pp. 30-32, 1 photo, 1 table.

Cause of the die-off unknown; 5 apparently ailing birds collected were rather heavily parasitized; the findings, by Dr. Clifford Nelson, are presented in the table; notes on earlier investigations as to parasites of the herring gull also are reported; the chief source of parasitism is probably the common rough fishes fed upon by the gulls.

Diseases and Parasites: Of muskrat

Takos, Michael J. A review of the literature on diseases and parasites of the muskrat, Maine Cooperative Wildlife Research Unit (University of Maine, Orono), 14 pp., table (mimeographed), Dec. 1940.

Summary of published records of diseases and tabulation of the occurrence of parasites with bibliography of 52 titles. From author's summary: "(1) From a survey of the literature, descriptions of muskrats suffering from leukemia, septicemia, lobar pneumonia, inflamed eyes, pyemia, 'haemolytic streptococcus', tuberculosis, coccidiosis, tularemia, and a skin ailment of fungous origin have been noted; (2) coccidiosis, tularemia, and abscesses leading to generalized pyemia are known to be fatal to muskrats in a wild state; (3) coccidiosis shows some possibility of human control; (4) parasites described from the muskrat include seven protozoa, twenty-eight trematodes, twelve cestodes, and nine nematodes. Two sucking lice, a flea, five parasitic mites, and a tick have also been found on the muskrat."

Diseases and Parasites: Of muskrat, ringworm

Charles, Vera K. A ringworm disease of muskrats transferable to man, Journ. Washington Acad. Sci. (W. W. Diehl, U. S. Bureau of Plant Industry, Washington, D. C. 50 cents a copy), 30(8), Aug. 1940, pp. 338-344.

Description of the dermatitis, symptoms, and treatment in man; occurrence and effects in muskrats; cultural characters and identification of the fungus as Trichophyton mentagrophytes. This parasite is known also from the gray squirrel. Bibliography of 8 titles.

Ecology: Census methods; woodland birds

Colquhoun, M. K. The density of woodland birds determined by the sample count method, Journ. Animal Ecology (Cambridge University Press, 200 Euston Road, London, N.W. 1, England. 20 shillings a copy), 9(1), May 1940, pp. 53-67, 3 tables.

Discussion of the value and utilization of counts as a basis for population estimates, in the light of field studies in England. Paragraphs from the author's summary: "(1) The distinction between a census and a count has not always been appreciated, and a more cautious use of the former term seems desirable; (2) in sampling woodlands the unit of time is preferred to that of space, together with a slow observing speed and a random rather than a fixed course; (4) a formula is given from which a coefficient of conspicuousness for each species can be obtained, and tentative coefficients are given for those species which bred within the area. When the coefficient is known the computing of populations from sample counts should prove possible." Bibliography of 13 titles, 10 of American papers.

Ecology: Effects of vole activities

Summerhayes, V. S. The effect of voles (Microtus agrestis) on vegetation, Journ. Ecology (Cambridge University Press, 200 Euston Road, London, N.W. 1, England. 25 shillings a copy), 29(1), Feb. 1941, pp. 14-48, 2 pls., 5 figs., 13 tables.

Studies in forest plantations by several years of observations upon exclosure and check plots. The following is quoted from the author's general conclusions: "The experiments carried out during the period 1932-8 have shown that voles exert a definite influence on the vegetation in the two areas studied. The general effect is apparently that of reducing the luxuriance of the dominant grasses so that other flowering plants and especially mosses are enabled to exist more abundantly among the dominants. On removal of the vole attack the non-dominants, particularly the mosses, decrease in abundance, apparently as a result of the increased competition with the more luxuriant dominants. Voles therefore tend to preserve a relatively open vegetation, comparatively rich in species. This is presumably effected by the direct eating or cutting up of the aerial parts of the dominants, and by the complicated series of burrows below the main surface of the vegetation, the formation and maintenance of these burrows preventing the development of large tussocks of grasses like Molinia or of thick matted turf-like growth as in Holcus mollis."

Ecology: Exclusion plots

Costello, David F., and George F. Turner. Vegetation changes following exclusion of livestock from grazed ranges, Journ. Forestry (Mills Bldg., Washington, D. C. 50 cents a copy), 39(3), March 1941, pp. 310-315, 3 photos, 3 tables.

Although concerning livestock investigations, this paper is of value to wildlife manager in pointing out difficulties connected with studies by the exclusion plot method. The influence of rodents and other wildlife is the subject of one section of the discussion. Authors' conclusion: "Expected results from enclosures and protected areas are not always obtained. This is not the fault of the enclosure method. Lack of contrast between grazed and ungrazed areas deserves as much attention as outstanding differences between these areas. Interpretations of results from enclosures should always be accompanied by and based on detailed study of the factors which cause change in the vegetation."

Ecology: Fires

Sladdix, W. L. Forest fires and game, Southern Sportsman (Stock Bldg., Austin, Texas. 10 cents a copy), 5(8), March 1941, pp. 16, 34, 7 photos.

This article refers only to the destructive effects of fires and says nothing of controlled burning nor of the proofs of beneficial results of fires which have been adduced by S. W. Greene and Herbert L. Stoddard in numerous papers that have been abstracted in WILDLIFE REVIEW.

Ecology: Hedgerows

Patton, C. P. Farm hedges and their practical management with special reference to ditchbank vegetation, North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. C.), 5(5), May 1941, pp. 8-10.

Discussion of the objections that are urged against hedges and statement of their values. "When the advantages of hedgerows across open fields are considered they far outweigh any disadvantages which could possibly be mentioned."

Ecology: Muskrat

Bellrose, Frank C., and Louis G. Brown. The effect of fluctuating water levels on the muskrat population of the Illinois River Valley, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 206-212, 12 tables.

Authors' abstract: "Based on house density, studies made along the Illinois River revealed a direct as well as an indirect effect of water levels

on muskrat populations. Indirectly, muskrats were affected by the composition of the vegetation in the habitat. Vegetation communities were determined chiefly by seasonal changes of water levels. The waters of lakes were classed as stable, semistable, or fluctuating. Six times as many houses per unit area were recorded in lakes with stable, as in those with semistable, waters, and twice as many occurred in areas with semistable, as in areas with fluctuating, water levels. Cattail (Typha latifolia) communities supported more muskrat lodges per acre than any other plants. River bulrush (Scirpus fluviatilis), the most abundant marsh plant, was second to cattail in house density per acre. Marsh smartweed (Polygonum muhlenbergii) supported fewer houses per unit area than river bulrush, and wildrice (Zizania aquatica) contained fewer houses per acre than marsh smartweed. American lotus (Nelumbo lutea) beds formed 28.4% of the aquatic vegetation, but, in all but one lake, there were 50% fewer lodges per acre than in river bulrush or marsh smartweed communities."

Ecology: Populations, bird

Peterson, Roger T. How many birds are there?, Audubon Magazine (1006 Fifth Ave., New York, N. Y. 35 cents a copy), 43(2), March-April. 1941, pp. 179-187, 6 photos.

Discussing some of the basic data, the author guesses that, "eventually we will find not less than 5,000,000,000 breeding birds in the United States and probably closer to 6,000,000,000."

Ecology: Populations, vole

Leslie, P. H., and R. M. Ransom. The mortality, fertility, and rate of natural increase of the vole (Microtus agrestis) as observed in the laboratory, Journ. Animal Ecology (Cambridge University Press, 200 Euston Road, London, N.W. 1, England. 20 shillings a copy), 9(1), May 1940, pp. 27-52, 2 figs., 12 tables.

A technical paper of value to those interested in theoretical population dynamics. The word "natural" seems out of place in the title. Average age was around 34 weeks, the sex ratio was slightly inclined to the male side, the rate of increase amounted to about 90 per 1,000 per week, "which corresponds roughtly with a power of multiplying some ten times in six months." Bibliography of 14 titles.

Ecology: Succession

Lee, Wm. D. Native plant succession on piedmont soils, North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. C.), 5(3), pp. 3-5, 14-15, 4 photos.

General description of plant successions with notes on accompanying changes in animal life.

Ecology: Succession on eroded land

Smith, Charles C. Biotic and physiographic succession on eroded farmland, Ecological Monographs (Duke University, Durham, N. C. $1.50 a copy), 10(3), July 1940, pp. 421-484, 1 fig., 33 tables.

Oklahoma, although one of the last States to be settled, has suffered as much soil erosion since agricultural occupation as some of the oldest farming districts of the United States. The author reviews literature bearing upon his study and gives a 3-1/2-page bibliography. He describes the region and methods of investigation and discusses successional phenomena in detail. Animals are given more attention than plants and there are sections on each of the orders of vertebrates represented. From the author's summary:

"In general, animals play a secondary role in soil succession. Excreta and remains of animals may be more important for their stimulating effect upon plant growth because of certain chemical substances present in the remains than for organic matter added to the soil. More or less mechanical loosening of soil is brought about by activities of animals."

"Rodents require both food and cover to be present in at least minimum quantities before they will occupy an habitat. If food is plentiful, an area may be occupied even though only a very smallamount of cover is available or if excellent cover is present and only a small food supply available an area will be occupied by certain species of rodents. The pioneer stages, with their large-seeded species of plants such as Helianthus, Ambrosia, Croton and Aplopappus ciliatus offer very attractive food to many rodents even though cover is very scanty. Midseral stages, with vegetation consisting largely of annual grasses such as species of Aristida, offer very little food attractive to most rodents and a type of cover that does not seem particularly attractive to these animals. The subclimax stage, with its scattering of perennial grasses and rather abundant legumes, offers good year-around cover and a plentiful food supply; thus we find this stage showing the largest population of rodents. Although somewhat less food is available in climax prairie, excellent cover is present and a large population of rodents is found. Insectivores were found only in subclimax and climax communities, apparently being limited to stages in succession where the soil is rich and where ground dwelling insects and earthworms are abundant.

"Meadowlarks were found to be most abundant in midseral stages. The following factors are to be considered in explaining this: (1) low population of rodents of these stages, (2) a large population of insects, especially grasshoppers, in these stages furnishes abundant food for these birds, (3) favorable nesting sites and nesting material. Other birds characteristic of the prairie were not found nesting in any of the seral stages."

Economics: Value of birds

Collinge, Walter E. Economic ornithology and the nation, North Western Naturalist (T. Buncle & Co., Ltd., Market Place, Arbroath, Scotland. 2 shillings a copy), 15(4), Dec. 1940, pp. 216-218.

This author has repeatedly tried to arouse the British nation to the importance of supporting the study of economic ornithology, and now that he has passed the retirement age can scarcely be charged with having a selfish motive. The importance of the subject is succinctly stated. Fruit-growers and farmers cannot afford to neglect any agency that is conducive to better crops. Birds are a stupendous force for good and their study and fostering is a proper pressing function of the state. Agriculture is a branch of biology and it is only when its problems are attacked with a biological point of view that full success is likely to be attained. Especially at present is there acute need for encouragement of all natural aids to farming.

Education

Keller, J. O. The Edward K. Love Conservation Foundation. A year's progress in the encouragement of wildlife conservation (University of Missouri, Columbia), 20 pp., illus., April 1941.

Report of the Board of Governors of the Foundation on results obtained through awards of prizes and scholarships to 4-H Club members and Future Farmers of America.

Education: Coastal wildlife

McAtee, W. L. Wildlife of the Atlantic Coast salt marshes, U. S. Dept. of the Interior, Wildlife Circ. 11 (Supt. of Documents, Washington, D. C. 15 cents a copy), iv+32 pp., 7 pls., 10 figs., 1941.

"Salt marshes of the Atlantic coast have been formed under the opposed tendencies of sinking of the land and of its upbuilding by silt and sand. The plants that form the marshes occupy zones largely determined by the degree of inundation by tides. Eelgrass entirely submerged, smooth cordgrass regularly washed by the tide, and marsh hay covered only by exceptionally high water are characteristic plants. Each zone is the home or feeding area of certain kinds of wildlife. The appearance, distribution, and habits of the more common species are described, and general wildlife conservation is urged. This circular, which is intended for educational use, is a revision of Department of Agriculture Circular 520, issued in March 1939."

Education: 4-H clubs

Harrill, L. R., et al. The wildlife conservation program of the 4-H clubs in North Carolina, North Carolina Wildlife Conservation (Division of Game and Inland Fisheries, Raleigh, N. C.), 5(4), April 1941, 16 pp., illus.

The whole issue is devoted to 4-H club conservation work, and is contributed to by Ross O. Stevens and by several county agents. The clubs make surveys of the physical features, vegetation, and wildlife of farms. The program has brought closer understanding between fathers and sons, developed community cooperation, and improved hunter-farmer relationships. An outline of the work is given, the value of a wildlife camp as an incentive is made clear, and results for a number of counties are summarized.

Food Habits: Damage to corn by muskrats

Errington, Paul L. Muskrats in the corn, Farm Science Reporter (Ag Annex, Iowa State College, Ames), 1(4), Oct. 1940, pp. 14-16, 3 photos.

The loss is usually moderate, say 2 bushels to a field, and can in most cases be more than compensated for by sale of pelts of the animals.

Food Habits: Rabbit damage

Foster, W. S. Rabbits will eat your grass, Progressive Farmer (821 N. 19th St., Birmingham, Ala.), 56(2), Feb. 1941, p. 71, 2 photos.

A test made by the New Mexico State College indicates "that the removal of cattle and rabbits from a range x x x will allow it to be revegetated naturally, but that removal of cattle alone will not accomplish the desired results."

Food Habits: Utilization of broomsedge

Davison, Verne E., and William R. Van Dersal. Broomsedge as a food for wildlife, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 180-181, 1 pl.

Authors' abstract: "It has generally been assumed that broomsedge (Andropogon virginicus) is of relatively little use to wildlife as food. Records obtained by stomach examinations have borne out this assumption. Hundreds of small birds, principally song sparrows and juncos, were observed feeding on the seed of broomsedge--the only apparent food available above a 12-inch blanket of snow--January 23, 1940 along Highway 51 for about 100 miles south of Jackson, Mississippi. Repeated stops were made to verify the fact that broomsedge was being taken extensively and exclusively within less than 24 hours following the unusual weather condition for south Mississippi. Though the authors do not suggest the planting of broomsedge, the observation strengthens the belief that plants which supply emergency needs are occasionally as important as preferred foods in wildlife management."

Food Habits: Utilization of Russian thistle

Long, W. S. The utilization of Russian thistle by wildlife, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 136-158.

Author's abstract: "The exotic Russian thistle (Salsola pestifer), long considered a noxious weed, is found to be of value to some forms of wildlife in the arid and semi-arid portions of the west. Seven species of birds and ten species of rodents are noted as having utilized the plant, either for food or cover."

Food Habits: Of cat

McMurry, Frank B., and Charles C. Sperry. Food of feral house cats in Oklahoma, a progress report, Journ. Mammalogy (Wm. B. Davis, College Station, Texas. $1.00 a copy), 22(2), May 1941, pp. 185-190, 4 figs.

Report on 84 well-filled stomachs, discussed in 3 locality groups, and combined. Authors' summary: "Laboratory analyses x x x revealed 3 main foods, namely, insects, mammals, and garbage. Reptiles and birds were minor items. Insects contributed 17 and 25 per cent, respectively, to the food of cats collected on the Wichita Mountains Wildlife Refuge and in the residential section of the Fort Sill Military Reservation, but much less to the diet of cats from other sections. Mammals, chiefly rodents, composed from a half to four-fifths of the food of the cats in each habitat group except those collected in the residential section of Fort Sill where they made up only 10 per cent of the diet. Garbage formed two-thirds of the food of the cats collected in the residential areas on Fort Sill. In other environments it was from 10 to 16 per cent of the food. Lizards formed 4.5 per cent of the food of cats from the Wichita Mountains Wildlife Refuge, but they were not taken at all by the Fort Sill cats and comprised only 1.5 per cent of the food of the cats collected in other sections. Birds comprised 6.5 and 6 per cent, respectively, of the food of cats taken in the residential district of Fort Sill and of those obtained here and there along highways of the State. They occurred only once each in the two groups of cat stomachs representing the Wichita Mountains Wildlife Refuge and the nonresidential area of Fort Sill. In other words, cats of residential areas and those frequenting roadsides appear to be a greater menace to birds than cats hunting in open fields or woods. The data at hand, however, indicate that the prey of cats consists largely of the most abundant and available forms and do not justify the common belief that every roadside or field-roaming cat is in search of avian food."

Food Habits: Of coot

Jones, John C. Food habits of the American coot with notes on distribution, U. S. Dept. of the Interior, Wildlife Research Bul. 2 (Supt. of Documents, Washington, D. C. 25 cents a copy), iv+52 pp., 7 pls. (1 col.), 1 map, 6 tables, 1940.

As indicated in the title, distribution is given more attention than is usual in publications of this type; a map is reproduced that shows the breeding and winter ranges and the localities for extralimital records. The general habits are briefly, and the food habits fully, described. Based on calculations of the contents of nearly 800 stomachs, the food of the coot appears to be about 90 percent vegetable. The most important sources are the pondweed, sedge, and grass families and the algal order. The animal food, taken in all months, was chiefly insects. These items were much more prominent in the food of the young, totaling 46.6 percent. All of the food items are discussed and tabulated, and briefly summarized also by regions. Ingestion of gravel and shot receives special treatment and the economic status of the coot is reviewed. No trace of birds or their eggs was found in the

stomachs. Some damage is done to rice in California. Other depredations are sporadic, and the coot is regarded as normally an inoffensive bird. Bibliography of 27 titles.

Food Habits: Of cottontail

Dalke, Paul D., and Palmer R. Sime. Food habits of the eastern and New England cottontails, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 216-228, 2 figs., 9 tables.

Authors' abstract: "Food habits of the eastern cottontail (Sylvilagus floridanus mallurus) and the New England cottontail (Sylvilagus transitionalis) are treated together since all data indicate that the feeding habits of the two species are practically identical. Four methods were used in determining the feeding habits: (1) Direct observation of feeding animals, (2) inspection of feeding areas as evidenced by pellets, (3) examination of vegetation near tracks in the snow, and (4) analysis of stomach contents. Observations on cottontails during daylight hours showed two pronounced feeding periods: The first, three to four hours after sunrise; and the second, from sunset to one hour after. The feeding habits follow closely availability of plants as they develop from early spring to late fall. The diet during the winter months is largely bark, twigs, buds, and dried herbs. In spring the feeding habits change abruptly with the appearance of tender young shoots of herbaceous plants; herbs are largely used from that time through October. In captivity, rations of twigs, bark, and buds over a period of a month proved to be inadequate to maintain body weight. Of the 24 plants tested in these experiments, chestnut, basswood, serviceberry, yellow birch, sassafras, red maple, hawthorn, ironwood, elm, and red oak proved to be the most palatable. Analyses of the contents of 75 stomachs collected from April through October showed that grasses compose nearly half, and other herbaceous plants 31%, of the food. All herbs together formed 75% of the summer diet." Bibliography of 13 titles.

Food Habits: Of coyote

Murie, Adolph. Ecology of the coyote in the Yellowstone, U. S. Dept. of the Interior, Fauna of the National Parks, Bul. 4 (Supt. of Documents, Washington, D. C. 30 cents a copy), 206 pp., 57 figs., 1940 (1941).

This publication reports upon about two years of work on coyote relationships to the elk, mule deer, antelope, bighorn, and other mammals and birds of Yellowstone National Park. The fauna is not greatly different from that recorded in early days and the role of the coyote is about the same. The population of this predator has shown no tendency to rapid increase since cessation of control activities. Natural mortality is shown to be prevalent in all groups and this is efficacious in providing food in the way of moribund and dead animals for the coyotes and, applying to them as well, in holding down their numbers. Discussion of food habits makes up the bulk of this paper which finds the coyote no menace in the Yellowstone and recommends continuance

of the present policy of noninterference with predators. Bibliography of 24 titles.

Food Habits: Of crane, sandhill

Tanner, Dean. Autumn food habits of the sandhill crane, The Flicker (Mary Elwell, Duluth Teachers College, Duluth, Minn.), 13(2), May 1941, p. 21.

Analysis of droppings from Clay County, Minn., revealed corn, 94.4, sweetclover leaves 4.4, and flax flower stalks and pods 1.3, percent. Lesser items are mentioned and results of a Wisconsin study are quoted.

Food Habits: Of grouse, ruffed

Kuhn, Tracy M. November foods of the ruffed grouse in Pennsylvania, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg. 10 cents a copy), 12(2), May 1941, pp. 10-11, 28, 3 photos, 7 tables.

Comparison of 1939 with the 1938 results (the latter noticed in WILDLIFE REVIEW, No. 26, Feb. 1940, p. 20). This report upon 207 crops includes a tabulation showing frequency of occurrence of the food items, and the volumes and parts taken. The leaders are buds and twigs of aspen, and fruits of Vitis. In the preceding year cherry and sheep sorrel headed the list. The results for the two seasons are combined in tabulations and compared with those published for the George Washington National Forest in Virginia.

Food Habits: Of hawk, Cooper's

McDowell, Robert D. The Cooper's hawk in Pennsylvania, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg. 10 cents a copy), 12(1), April 1941, p. 4, 2 figs., 3 tables.

The number of specimens examined, 1937-1940, was 291. So far as permitted by the condition of the carcasses, data were recorded, and are tabulated, on sex and age groups, weights and principal measurements, and food items. The numerical system is employed in presenting the results as to food; mammals constituted 28.57, and birds 71.44, percent, respectively, of the captures. The consumption of three-fourths of the diet is considered as harmful to man's interests.

Food Habits: Of hawk, duck

Stager, Kenneth E. A group of bat-eating duck hawks, Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif. 50 cents a copy), 43(3), May-June, 1941, pp. 137-139.

The availability of easy prey in a great flight of free-tailed bats (Tadarida mexicana) from a cave in south-central Texas, attracts duck hawks that feed regularly upon the bats.

Food Habits: Of heron, great blue

Stiles, Bruce F. Nesting of the great blue heron in Pottawattamie County, Iowa Bird Life (Minthrop, Iowa. 25 cents a copy), 10(2), June 1940, pp. 20-22, 1 pl.

Brief general account of a nesting colony that was within a mile of a lake "in which game fish are stocked rather extensively." Examination of several pounds of fish remains from the ground under the nests revealed bones of only gar and carp.

Food Habits: Of raptors

Moon, Eugene L. Notes on hawk and owl pellet formation and identification, Trans. Kansas Acad. Sci. (Roger C. Smith, Sec'y., Manhattan, Kans.), 43, 1940, pp. 457-466, 2 tables.

Report on studies of pellets collected almost daily from resorts of the barn, great horned, long-eared, and short-eared, owls, and marsh hawk, giving notes on appearance, size, characteristics, and contents of the pellets. Bibliography of 25 titles.

Food Habits: Of seals

Dunbar, M. J. On the food of seals in the Canadian Eastern Arctic, Canadian Journ. Research (National Research Council, Ottawa, Canada. 50 cents a copy), 19(5), May 1941, Section D, pp. 150-155, 2 tables.

Review of literature (13 titles cited) on food of seals and report on examination of stomachs of: the ringed seal (Phoca hispida), 47, and harp seal (Phoca groenlandica), 1, both feeders on pelagic crustaceans; and bearded seal (Erignathus b. barbatus), 5, found to consume crustaceans, mollusks, and fishes. Scientific names of the food species are given.

Food Habits: Of snake, king

Petrides, George A. The coral king snake a predator upon the russet-backed thrush, Yosemite Nature Notes (Yosemite National Park, Calif.), 20(5), May 1941, p. 36.

Swallowing a nestling.

Food Habits: Of sparrow, chipping

Knowlton, G. F., and F. C. Harmiston. Insect food of the chipping sparrow, Journ. Economic Entomology (E. N. Cory, College Park, Md. 75 cents a copy), 34(1), Feb. 1941, pp. 123-124.

Names and numbers of insects identified from 41 gizzards collected in Utah, with briefer references to the seeds found.

Food Habits: Of vulture, turkey

Scott, Thos. G. Feeding by turkey vultures at dens of the northern plains red fox, Ecology (Prince and Lemon Sts., Lancaster, Pa. $1.50 a copy), 22(2),April 1941, pp. 211-212, 1 table.

Suggestive evidence that vultures take remains of prey from the vicinity of fox dens. The table compares food of red foxes and young vultures near Boone, Iowa, in summer.

Food Habits: Of vulture, turkey

Scott, Thos. G., and Robert Moorman. Turkey vultures in central Iowa, Iowa Bird Life (Winthrop, Iowa. 25 cents a copy), 10(3), Sept. 1940, pp. 34-37, 1 pl., 1 table.

Habits, care and growth of young, food. Fifteen samples of crop contents of young are tabulated and discussed and notes on the food of adults also are given.

Food Habits: Of woodpecker, pileated

Downing, Glenn R. The winter habits of the northern pileated woodpecker in Iowa, Iowa Bird Life (Winthrop, Iowa. 25 cents a copy), 10(3), Sept. 1940, pp. 43-46, 1 photo.

Account of general habits with specific notes on food. Analyses of droppings disclosed mainly remains of carpenter ants.

Introduction: Caribou

Cox, W. T. The fight for the woodland caribou, American Forests (919 Seventeenth St., N. W., Washington, D. C. 35 cents a copy), 47(2), Feb. 1941, pp. 55-57, 93-94, 4 photos.

Popular account of the depletion of this species, especially in Minnesota, and of its re-introduction. (Several papers relating to the subject have been abstracted in earlier issues of WILDLIFE REVIEW.) Some of the imported animals are reproducing.

Introduction: Elk

Kartchner, K. C. Elk introduction to Arizona, Arizona Wildlife and Sportsman (125 North Second Ave., Phoenix, Ariz. 15 cents a copy), 2(5), Aug. 1940, pp. 2, 11.

The native Merriam's elk was exterminated by 1898. Introduction of Rocky Mountain elk was begun in 1913 and continued for a decade or more. The methods used are described. By 1940 the animals numbered about 4,000. Hunting under permit is allowed but complaints of damage to crops are becoming more numerous.

Life Histories: Beaver

Seamans, Roger. The distribution of beaver in Vermont, Vermont Fish and Game Service (Montpelier), Bul. 3-1, Jan. 1941, 5 pp., 1 map, 2 tables (processed).

The contents, broader than indicated by the title, include a discussion of the decline of beavers in the State and of the results of restocking, and notes on the present numbers of the animals, colony characteristics, food, and economic status. The map shows the distribution of beaver colonies in October 1940.

Life Histories: Boar, Wild

Bruce, Jay. More about the habits of the wild boar, California Conservationist (State Dept. of Natural Resources, Sacramento. 15 cents a copy), 6(5), May 1941, pp. 14, 21, 2 photos.

Information on the colony in Monterey County, Calif. Food much the same as that of free-ranging domesticated swine, largely acorns. The wild pigs feed mainly at night. Although kept in check apparently by coyotes and mountain lions, the wild boars have increased their range. Predator control is urged but it would seem that the desirability of encouraging this introduced beast should first be made clear.

Life Histories: Crayfish

Tack, Peter I. The life history and ecology of the crayfish Cambarus immunis Hagen, Amer. Midland Naturalist (Notre Dame, Ind. $1.00 a copy), 25(2), March 1941, pp. 420-446, 2 pls., 2 figs., 5 tables.

Taxonomic status, habitat, activity, burrows and chimneys, mating, oviposition, incubation, stages, growth, mortality, propagation, food, natural enemies. New York. Two-page bibliography.

Life Histories: Deer, White-tailed

Seamans, Roger. Deer weights and measurements, Vermont Fish and Game Service (Montpelier), Bul. 3-2, February 1941, 16 pp., 3 figs. (1 map), tables (processed).

"The annual legal kill of deer in Vermont has steadily increased since the first [modern] open season of 1897." That in 1940 was 3,403 legal bucks. "It was made up of a normal distribution of all ages and the marked increase does not appear to be due to a larger fawn crop for any one year." Weights (90-150 lbs.) and measurements are tabulated and summarized. Report is made on abnormalities found in 22 specimens. In general, however, the animals were in fine condition.

Life Histories: Ducks, Scaup

Munro, J. A. Studies of waterfowl in British Columbia. Greater scaup duck, lesser scaup duck, Canadian Journ. Research (National Research Council of Canada, Ottawa. 50 cents a copy), D, 19, pp. 113-138, 4 pls., 3 tables, 1941.

Distribution, food habits, and behavior receive most consideration; there is a bibliography of 17 titles. Author's abstract: "Nyroca marila is an abundant migrant through British Columbia and large numbers winter in the coast region. The sex ratio in winter flocks is predominantly male. Chara was the chief food eaten by 57 specimens from Okanagan Lake, miscellaneous vegetable matter was second, and molluscs third in importance. Food items, listed in order of importance, on coast streams and lakes were: vegetable matter, molluscs, salmon eggs, salmon flesh, and, on salt water: gastropods, sea lettuce (Ulva sp.), crustaceans, and herring eggs. N. affinis nests commonly in parts of the dry interior and elsewhere in the province is a migrant and scarce winter visitant. Sex ratio is predominantly male. Courtship continues through April and May; laying commences in June and late clutches are found in August. Females defend their young vigorously and a habit of combining broods has a probable survival value. Males raft on certain lakes in July and go into eclipse as flight feathers are shed. These populations include yearling and post-breeding females and later, adolescents. The former moult at this time. Adults migrate early and those remaining are largely young of the year. Amphipods are the chief food of all age groups on the nesting ground; aquatic insects and seeds of aquatic plants are also important. Both species of scaup ducks are economically important as food and for sport in the interior but less so on the coast where, because of a different diet, their flesh is less palatable. It was not determined whether the consumption of salmon eggs and herring eggs is of economic significance. Elsewhere than on the coast scaup ducks are related to other interests only to the limited extent to which they are food competitors of trout and other commercially valuable fishes."

Life Histories: Gila monster

Jackson, Earl. As tough as they come, National Park Service, Region 3 (Santa Fe, N. Mex.) Quarterly, 3(2), April 1941, pp. 3-9, 1 photo (frontispiece) (processed).

Distribution of the two known species of the genus Heloderma; description and notes on the life history of the Usonian form, including oviposition and food habits. The biting propensities and venomous qualities are discussed; the Heloderma is not afraid of a rattlesnake and in an enclosure vanquishes the snake; the "monster's" hide is too tough for the fangs of the rattler to penetrate.

Life Histories: Grouse

Krefting, L. W. The grouse of Minnesota, Conservation Volunteer (Minnesota Dept. of Conservation, St. Paul), 2(9), June 1941, pp. 24-29, 1 pl.

Notes on distribution, numbers, appearance, local names, and food habits of 5 species.

Life Histories: Grouse, Ruffed

Tanner, Dean. A submarginal population of ruffed grouse, The Flicker (Museum of Natural History, University of Minnesota, Minneapolis), 13(1), March 1941, pp. 7-9.

Description of scantily-occupied habitats and of the habits of the birds therein, particularly as to drumming and feeding. Identifications of numerous food items from droppings are recorded.

Life Histories: Kangaroo rat, Tulare

Tappe, Donald T. Natural history of the Tulare kangaroo rat, Journ. Mammalogy (Wm. B. Davis, College Station, Texas. $1.00 a copy), 22(2), May 1941, pp. 117-148, 2 pls., 4 figs., 4 tables.

Dipodomys heermanni tularensis. After outlining the range of the subspecies (map) and describing methods of the study, the author presents his findings under the heads of burrow systems, food and storage, economic importance, water requirements, activities, sanitation, voice and communication, senses, locomotion, methods of escape from enemies, breeding, growth, development, and behavior of young, population movements, animal relationships, and length of life. The food consists chiefly of seeds, especially those of grasses, but includes some green grass and other plants. Bibliography of 21 titles.

Life Histories: Muskrat

Grimm, Wm. C. The muskrat in northwestern Pennsylvania, Pennsylvania Game News (Pennsylvania Game Commission, Harrisburg, 10 cents a copy), 12(2), May 1941, pp. 6-7, 2 photos, 2 tables.

Foods discussed and tabulated (cattails and sedges are favorites); feeding habits described; sex ratio (58:41); age composition (four-fifths of the fall population young); average length (22 inches); weight (2.37 lbs.); notes on number of litters and characteristics of young; the possibility of a cycle in numbers is considered.

Life Histories: Partridge, Hungarian

Carlson, C. Edward. The Hungarian partridge in Minnesota, Conservation Volunteer (Minnesota Dept. of Conservation, St. Paul), 2(7), April 1941, pp. 41-44.

Summary of introductions in N. A. and their success. The first birds in Minnesota came by natural spread from Iowa. Despite extensive plantings, the species has not become established outside of the region of intensive corn and small grain production. There, however, it thrives. Life history notes based on original observations.

Life Histories: Pheasant nesting success

Baskett, Thomas S. Production of pheasants in north-central Iowa in 1939, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 168-174, 4 tables.

Author's abstract: "On a plot of 1,520 acres in north-central Iowa, 72 pheasant nests were found by repeated systematic searches. Density of nests was high in fencerows and road ditches, but percentage of success, low. In small grain, density was low, but success, high. Predation by several species caused losses of 40% of the 45 unsuccessful nests. The mean clutch size was 10.4 and mean brood size for older broods, 6. An estimated 90 young were produced by 50 adult pheasants per sq. mile." Bibliography of 11 titles.

Life Histories: Pocket gopher

Schoffer, Theo. H. Excavation of a runway of the pocket gopher (Geomys bursarius), Trans. Kans. Acad. Sci. (Roger C. Smith, Sec'y., Manhattan), 43, 1940, pp. 473-478, 3 figs.

Isolated tunnelling by a single female described and illustrated. It measured 510 feet in the aggregate and was accompanied by 105 mounds.

Life Histories: Prairie dog

Clapp, Kennedy N. Prairie dogs, National Park Service, Region 3 (Santa Fe, N. Mex.), Quarterly, 3(2), April 1941, pp. 21-25, 1 fig. (processed).

Original habitat; present range; reduction was inevitable but the author favors restricted preservation as in parks. Burrows, and the feeding and other habits are described. Rattlesnakes and burrowing owls are in no sense commensals, they are deadly enemies of the prairie dog and the reverse also is true.

Life Histories: Sex ratio, mourning dove

Pearson, Allen M., and George C. Moore. Dove sex ratio found almost evenly divided, Alabama Conservation (Alabama Dept. of Conservation, Montgomery), 1(7), May 1941, p. 8.

Tabulation of sex determinations of 3,491 doves by months; the average is 51.82 percent males.

Life Histories: Sex ratio, pheasant

Buss, Irven O. Sex ratio of Wisconsin pheasants, Wisconsin Conservation Bulletin (Wisconsin Conservation Department, Madison), 6(5), May 1941, pp. 4-6, 2 tables.

Observed ratios may differ from those presumably nearer the actual as determined from trapped birds; an illustration is given showing the following discrepancy: Observed 1 to 12.2; trapped, 1 to 4.2. The tabulations relating to more than 75,000 birds are of observed sex ratios. The average for all counties is 1:4.5. Contrasting the records for a group of northern (and less hunted), and an equal number of southern (hence more hunted), counties, the ratios of 1:2.7 and 1:5.5, respectively, are obtained.

Life Histories: Wren, Bewick's

Miller, Edwin V. Behavior of the Bewick wren, Condor (W. Lee Chambers. 2068 Escarpa Drive, Eagle Rock, Calif. 50 cents a copy), 43(2), March-April 1941, pp. 81-99, figs. 25-27.

Summary of observations on several subspecies under the headings of: Animal relations, foraging, roosts, preening, songs and call notes, territory, nests, mating and nest-building activities, behavior during the laying period, and incubation. There is a summary and a bibliography of 28 titles.

Management: Attracting birds

Baker, John H. (Editor). The Audubon guide to attracting birds (Doubleday, Doran, and Co., Garden City, N. Y. $2.50 a copy), xviii+268 pp., 9 pls. (1 col.), 11 figs., tables, 1941.

Seven of the total of 12 chapters are by Roger T. Peterson; two of them relate to bird observation and photography and banding, and the others to attracting by planting, feeding, providing nest boxes and water, and creating watered areas. Richard H. Pough contributes two chapters on, "Our attitude toward predators," and on "Trespass and your rights." Dorothy A. Treat has a section on bird attraction as "An educational community project," and the editor two on "Maintenance of sanctuaries," and "How you can help protect our wildlife." There are appendixes listing plants attractive to birds in the northeastern States and giving useful references corresponding to the chapters. The various authors know their stuff and the result is a satisfactory manual.

Management: Beaver

Bradt, G. W. Beaver management pays, Michigan Conservation (Michigan Dept. of Conservation, Lansing), 10(5), April 1941, pp. 4, 5, 2 photos.

A closed season, beginning in 1920, restored beavers to the point where they were the cause of numerous reports of damage. Open seasons were, therefore, resumed in 1936 but at the same time a system of closed areas was established. The plan seems to be working well as the take of beaver and the population have been well maintained and complaints are much less numerous. Relations of beavers to trout, muskrats, and waterfowl are briefly discussed. Receipts from sales of pelts yield trappers about $150,000 annually.

Management: Burning

Terry, Elwood I. The future of forestry and grazing in the southern pine belt, Scientific Monthly (Lancaster, Pa., 50 cents a copy), 52(3), March 1941, pp. 245-256, 18 photos.

Those wishing to consult all of the important literature on burning in the Southeast should not miss this article. On the whole, it does justice to the contributions of S. W. Greene, several of which have been noticed in WILDLIFE REVIEW. The difference in point of view is graphically shown, however, by the addition of a single word to the title of one of Greene's articles, thus: "The forest that fire made" poor. Greene thinks of the relation of the longleaf pine forest to grazing, and Stoddard of its capacity for quail production, but the present author writes of it purely as a forest. He thinks that the other uses should be separated and that lands devoted primarily to timber production should be so managed as to yield the maximum. "There is plenty of land on which to develop both the South's magnificent forest resources and a splendid live-stock industry without mixing the two on the same areas to their mutual detriment." He would probably say the same with respect to game (quail are mentioned on p. 246) but this attitude should serve to temper foresters' claims about game producing values of the forest. Certainly their ideal, the uniform and closely stocked plantation, is a single-crop proposition, and its interior as nearly a "biological desert" as any vegetated area can well be.

Management: Controlled hunting

Burroughs, R. D., and Laurence Dayton. Hunting records for the Prairie Farm, Saginaw County, Michigan, 1937-1939, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 159-167, 2 figs., 5 tables.

Author's abstract: "The Michigan Department of Conservation has cooperated with the Farm Security Administration since 1937 in the management of a controlled hunting program on 8,400 acres of isolated farm and wasteland. Accurate records of hunting pressure and the annual kill of ring-neck pheasants (Phasianus colchicus torquatus) and cottontail rabbits (Sylvilagus floridanus mearnsii) have been obtained. The data are presented in 5 tables and are analytically treated. Hunting pressure increased from 8,168 man-hours in 1937 to 14,068 in 1938 and to 21,481 in 1939. In 1938 the pheasant kill jumped from 616 to 1,244 male birds; the kill in 1939 (1,318 male birds) showed only a 6% increase over that of 1938 in spite of a 34% increase in hunting pressure. This suggests that the kill per unit-area depends on the shootable population rather than on the hunting pressure. The fact that the kill per sq. mile remained almost constant (94 and 101) during 1938 and 1939 seems to indicate that we cannot expect this area to yield a much greater annual harvest of male pheasants without a definite improvement in the habitat. Approximately 66% of the pheasant kill has consistently been made during the first week of the hunting season, and 80% by the end of the second Sunday. Extending the open season from 15 days to 22 days in 1939 had but little effect on the seasonal kill; only 7% of the birds killed in 1939 were taken during the extra 5 days. The high kill of cock pheasants per unit-area does not appear to have had an adverse effect on normal mating and reproduction of this species."

Management: Farm game

Chalk, John D. The North Carolina cooperative farm game program, Pittman-Robertson Quarterly (U. S. Fish and Wildlife Service, Washington, D. C.), 1(1), Jan. 1941 (June), pp. 13-20 (processed).

Employment of a staff of biologists, establishment of a periodical to carry wildlife management information and news, and presentation to farmers of a simple program. "In regard to the harvesting of the wildlife the landowners have a chance to choose one of the plans following: (1) Sanctuary--for 5 years; (2) temporary sanctuary, and (3) regulated hunting." "While the purposes back of the temporary sanctuary idea are sound, we have found that we can accomplish the same thing under the regulated hunting plan and perhaps with more satisfaction." "At the present time there are 742 regulated hunting cooperators, with a total of 300,124 acres; 74 five-year sanctuary cooperators, with a total of 22,731 acres; and 62 temporary sanctuary cooperators, with a total of 26,335 acres." The field biologists advise farmers on management procedures. Cooperative agreements are signed under which "The Department agrees to furnish signs for posting the property and the landowner agrees to assist actively in game law enforcement." Details are given of the extent to which management practices have been adopted; these have been put into effect not only on the farms of signed cooperators, but by imitation on those of neighbors. The effects upon hunting are discussed, and while restrictive, they have not resulted in complaint. Sportsmen's organizations approve the work which has purposely been kept within modest limits, and not propagandized. Research is being carried on looking toward improvement of the program.

Management: Farm wildlife

Edminster, Frank C. Wildlife management through soil conservation on farms in the northeast, U. S. Dept. of Agriculture, Farmers' Bul. 1868 (Supt. of Documents, Washington, D. C. 10 cents a copy), 52 pp., 25 figs. (plus 2 cover illustrations), 3 tables, 1941.

Epitome: "Wildlife is a product of the land; hence, it is obvious that patterns of land use developed in pursuit of agriculture will in a large measure determine the abundance or scarcity of wildlife. The increasing destruction of soil by erosion and, in good part, the decreasing populations of farm wildlife have both resulted from misuse of land. The great need for reversing this process of waste has long been apparent. Some of the possible ways of checking erosion and increasing wildlife in the 12 Northeastern States are considered here. The principles and some of the practices apply to an area embracing the whole northeastern quarter of the country. Soil conservation as well as the conservation of wildlife depends fundamentally on the establishment and maintenance of vegetation. Soil will erode unless it is protected from rain and wind. Wildlife disappears unless there is a place for it to live. How wildlife habitats may be developed with vegetation used to protect the soil is told in this bulletin."

After certain general discussion of wildlife values and management, the author takes up the development of habitat through protection from fire and

grazing, treatment of cultivated lands, use of field hedges and windbreaks, planting of field borders, gullies, and stream-banks, and management of woodland and water areas. Lists are given of plants for use in each situation. Special practices beneficial to wildlife are discussed with respect to feed patches, winter feeding, and game refuges. For each of the principal plants recommended for environmental improvement, there is a brief paragraph embracing a terse description and statement of wildlife utilization and habitat preferences. An excellent bulletin.

Management: Farmer-sportsman relationship

Kircher, Wm. H. Hunting is not a nuisance, The Farmer (55-57 East 10th St., St. Paul, Minn.), 59(9), May 3, 1941, pp. 5, 12, illus.

Rather confused with an account of game research in Iowa, is that of the organization and experience of a club of 12 farmers who posted their land against hunting without permission, charged hunters a dollar a day for hunting over their combined properties, and had each hunting party accompanied by a club member. The last provision is apparently what made the scheme work.

Management: Forest game

Schilling, E. A. Wildlife management, Florida Game and Fish (Commission of Game and Fresh Water Fish, Tallahassee), 2(5), May 1941, pp. 12-14.

Statement as to refuges on national forests which have proved successful in maintaining game populations within their boundaries but not in restocking surrounding areas. Disadvantages of the refuges are analyzed and statement is made as to the measures taken to get better results from wildlife management areas. Eight such tracts totaling some two million acres are now established in the national forests of the Southeastern States. They have been under administration from 3 to 5 years; some of the results are cited; the outlook appears favorable.

Management: Harvesting, deer

Sanders, Earl. A preliminary report on the study of white-tailed deer in the Edwards Plateau of Texas, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 182-190, 9 tables.

Author's abstract: "A report of a study of dressed weights and antler point records of 825 buck deer examined during the 1938 hunting season in Gillespie, Kerr, Llano, and Mason counties in the Edwards Plateau of Texas. The deer were grouped in weight and antler point classes for the county in which taken. Body and antler measurements were made on 170 of them. Adequacy of county samples was tested against weights of 83 other deer, total kill on one ranch in Mason County. Records from 431 shooting preserves show 5,617 deer killed on 964,097 acres in these counties. The deer population density, hunting pressure, grazing pressure of domestic stock, and competition of deer and livestock for forage are discussed. The average dressed weight of the

825 deer was 73.77 lbs. and varied between counties from a low of 68.99 lbs. to a high of 79.56 lbs. The county that had the highest average dressed weight also had the largest number of acres per deer killed, and as the number of acres per deer killed decreased, the average dressed weight also decreased. A partial analysis was made of data for 86 ranches containing 200,700 acres on which 2,517 deer were killed; an average of one buck on each 79 acres."

Management: Inventory, game in eastern Tennessee

Wing, Leonard. A game survey in northeastern Tennessee, Journ. Tenn. Acad. Sci. (Kendall Born, Division of Geology, Nashville, Tenn. 50 cents a copy), 15(3), July 1940, pp. 309-320.

The author discusses the history of settlement of the area and the characteristics of the people as bearing upon wildlife. Reduction in game and the factors responsible for it are systematically treated. Ecological succession, the existing game species, and the future of the area are other topics considered. "East Tennessee is a region of considerable game potentialities but of few game realities. The realization of its fullest possibilities depends upon the changes in human outlook necessary to control detrimental activities, if not to eliminate them, and to assist in the upbuilding of the natural endowments. Properly handled and stimulated, the region can become one of the country's outstanding game areas. x x x Game management cannot be segregated from the social and economic status of the people of the area. The job is only started when a new feeder is installed. Game and land form two corners of a triangle, and the people form the third. This is especially true in the East Tennessee hills where the people are impoverished, their contact with the world restricted, their agriculture outmoded, and their educational facilities inadequate. x x x Successful game management in this region is linked with the improvement in the economic well-being of the people. Improvement in the economic conditions will bring social improvement and a more wholesome attitude toward the land and the attributes of the land. It is probable that the soils in the mountain areas will never be able to support adequately more than a fraction of the existing population. Game, forest products, and handicraft industries offer the best future for the area."

Management: Inventory, red fox

Scott, Thos. G. A method for estimating the red fox population, Iowa State College (Ames) Journ. Science, 15(2), Jan. 1941, pp. 155-159.

Description of the various kinds of evidence of the presence of foxes; occurrence on sections is determined by inspection for sign; a 5 percent sample appears adequate; occurrence is calculated as a frequency index of sections occupied and that multiplied by 1.6 (average maximum number of foxes per section) to obtain a population estimate.

Management: Inventory, turkey

Mosby, Henry S. The wild turkey in Virginia, Pittman-Robertson Quarterly (U. S. Fish and Wildlife Service, Washington, D. C.), 1(1), Jan. 1941 (June), pp. 1-13, 3 figs., 2 tables (processed).

Reference to available literature on the wild turkey of which 9 titles are cited. A map of the original, and the present, distribution of the species is presented and the estimate made that the bird now occupies only 28 percent of its former range. The bulk of the paper is devoted to presentation of the technique and results of an inventory of the turkey in Virginia. In 1937, it is believed that there were about 2,100 flocks totaling approximately 23,000 individuals.

Management: Muskrat

Highby, Paul R. Managing our muskrat resource, Conservation Volunteer (Minnesota Dept. of Conservation, St. Paul), 2(7), April 1941, pp. 17-20.

Chiefly compiled account of the life history and of management suggestions.

Management: Otter

Anon. Michigan otter still a puzzle, Michigan Conservation (Michigan Dept. of Conservation, Lansing), 10(5), April 1941, p. 5, 1 map.

An open season, concurrent with that on beavers, yielded only 266 otter pelts which brought from 8 to 12 dollars each. The plan is to be tried another year to learn whether otter trapping is of material value to the citizens and whether the otter population justifies cropping. Study of the food of 229 individuals revealed in their stomachs, one-quarter game and pan fishes, one-half forage fishes, and the remainder largely crayfishes, frogs, and insects.

Management: Planting

McAtee, W. L. Plants useful in upland wildlife management, U. S. Dept. of the Interior Conservation Bul. 7 (Supt. of Documents, Washington, D. C. 10 cents a copy), 50 pp., 5 plates, tables.

General discussion of the use of plants in wildlife management as cover makers and food producers and of management practices. The bulk of the bulletin is made up of lists of perennial plants valuable in furnishing cover, browse, herbage, mast, fruit, and seed in 10 regions of the United States. There is also a similarly classified list of plants that are adaptable throughout the country as a whole. Varieties of crop plants suitable for use in food patches are listed for every State and there is a discussion of the value to wildlife of plants often classed as weeds. In some way, not now clear, the subheading on page 8 was altered to an erroneous form. It should read, "Plants suitable for definite regions." On this same page the figure 10 in first line of second paragraph should be 11, and the initial in Dalke's name in footnote should be D.

Management: Planting for wildlife and erosion control

Johnson, J. A. Planting Lespedeza sericea with black locust, Soil Conservation (Supt. of Documents, Washington, D. C. 10 cents a copy), 6(12), June 1941, pp. 331-332, 334, 1 photo.

In Mississippi. Author's conclusions: "(1) L. sericea with locust improves the erosion-control value of the planting because a close ground cover is more quickly obtained. This is particularly true in winter when the heavier leaf mulch of L. sericea is needed to supplement the very light locust mulch; (2) locust does not suffer in growth as a result of competition from L. sericea. In fact, the opposite appears to be true. At New Albany where the areas were closely evaluated, locust plantings containing L. sericea are as good or better than those without it; (3) L. sericea is maintaining itself in 3- to 5-year stands of locust with a vigor indicative of a long existence, possibly even to the point of permanency; (4) as to whether or not the areas actually offer an improved wildlife habitat, it is apparent that a careful census of treated and untreated areas will be necessary before an authoritative statement can be made. The observations indicate, however, that the black locust-L. sericea areas are useful to rabbits, quail, and small birds. It was reported that quail made good use of the areas in the Laurel project during the nesting season."

Management: Quail food and cover

Lehmann, Valgene W., and Herbert Mard. Some plants valuable to quail in southwestern Texas, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 131-135, 1 fig., 2 tables.

Authors' abstract: "In southwestern Texas preferred habitat of the bob-white (Colinus virginianus) is sandy grassland with scattered brush, and farms not cleanly cultivated. Chestnut-bellied scaled quail (Callipepla squamata castanogastris) reach maximum numbers on tasajillo-pricklypear flats. Most important winter foods of bob-white in the Southwest are provided by Panicum texanum, Sorghum, and Croton capitatus, C. punctatus, and C. texensis, while Adelia angustifolia, Acacia roemeriana, and Lupinus subcarnosus are prominent food producers for the blue quail. A primary requisite of bob-white range is woody cover, principally for loafing in midday. Clumps 3 to 10 yards in diameter that provide concealment, freedom of movement underneath, and good visibility, are ideal. Distribution of woody cover approaches the optimum for bob-whites when clumps are located 100 to 200 yards apart. Cactus cover may be essential for heavy populations of chestnut-bellied scaled quail; when pricklypear is burned for cattle feed, therefore, clumps approximately 1 acre in size and 100 yards apart should be spared where quail are desired."

Management: Raccoon

Preble, Norman A. Raccoon management in central Ohio, Ohio Wildlife Research Station (Ohio State University, Columbus) Release No. 161, 9 pp., 1 fig. (mimeographed), April 1941.

Summary of the investigation upon which this leaflet is based, as to the abundance of raccoons and factors affecting it, color and measurements of the animals, sex ratio, annual kill, other mortality, den trees, food (60 percent corn), and economic status. Management suggestions are given in 17 brief paragraphs. Bibliography of 17 titles.

Management: Refuges

Plattes, Cyril. Refuge leader of the nation, Conservation Volunteer (Minnesota Dept. of Conservation, St. Paul), 2(7), April 1941, pp. 55-58.

The State has 188 refuge areas, totaling 3,335,505 acres and prohibits the shooting of waterfowl upon open water--a provision applying to an additional 3,000,000 acres. Minnesota has the largest single State sanctuary, 1,290,000 acres in the Superior National Forest. However, small refuges are more desirable and they should be carefully distributed. Present management is described and recommendations made as to the future. Seven State-owned combined refuge and public shooting areas are listed. "Development of Minnesota game refuges is progressing to the financial limit. Foremost in the minds of administrative officials is the basic function of a refuge: To produce an outflow of game to surrounding ranges. They are mindful that this outflow can only arise from population pressure within a refuge, and must necessarily vary with the mobility of the species to be given most protection. Therefore, they are viewing Minnesota's refuge program critically with a view of obtaining improved refuge patterns and better conditions for wildlife all around."

Management: Seal, Fur

Bower, Ward T. Alaska fishery and fur-seal industries in 1939, U. S. Dept. of the Interior, Bur. Fisheries, Administrative Report 40 (Supt. of Documents, Washington, D.C. 15 cents a copy), pp. 159-184, 2 pls., tables, 1941.

Contains a report on the composition of the Pribilof fur-seal herds by Harry J. Christoffers (his last as he died in 1939), and information on the harvest of skins, and manufacture of the by-products, meal and oil. The production and utilization of foxes and reindeer on the Islands also are reported.

Management: Small game, Oregon

Einarson, Arthur S. Suggestions on management of small game in Oregon, Oregon Agr. Expt. Sta. (Corvallis), Circ. 140, 18 pp., 3 figs., Jan. 1941.

This publication is based on the findings of the Cooperative Wildlife Research Unit. It reviews conservation activities and hunter practices in Oregon, and points out how greater public participation can aid the State game department in maintaining shootable small game. Suggestions are given for the selection and care of game-management areas with special reference to the

cruising tendencies of the species for which they are intended: ring-necked pheasant, bob-white, and valley quail, in particular. Mention is made also of blue and ruffed grouse and of the Hungarian partridge. Sections of the circular are devoted to aiding game in winter, controlling predators, protecting game, increasing water facilities, improving waterfowl food supply, and managing duck ponds and marshes.

Management: Transplanting valley quail

Einarsen, Arthur S. Contributions to the management of California valley quail, Murrelet (105 Anderson Hall, University of Washington, Seattle. 50 cents a copy), 22(1), Jan.-April 1941, pp. 8-11, 2 figs., 1 table.

These quail are so sedentary that their increase builds up large local concentrations, as many as 800-1000 birds in a band. Obviously a good management measure is trapping and transplanting. This proved easy and effective (methods described and results tabulated) and is recommended for further trial, due care being taken to select suitable environment for the releases.

Management: Turkey

Blakey, Harold L. A vanishing American, Florida Game and Fish (Commission of Game and Fresh Water Fish, Tallahassee, Fla.), 2(5), May 1941, pp. 3-5, 11, 2 photos.

Account of drastic reduction in the range and the numbers of the wild turkey, with special reference to developments now threatening the species in South Carolina. Account of measures that have been taken to improve Bull's Island, Cape Romain Refuge, for turkeys and suggestions for management elsewhere.

Natural History: Birds of Kansas

Long, W. S. Check-List of Kansas birds, Trans. Kans. Acad. Sci. (Roger C. Smith, Sec'y., Manhattan), 43, 1940, pp. 433-456.

Briefly annotated list of 427 species and subspecies.

Natural History: Reptiles of Washington

Owen, Robert P. A list of the reptiles of Washington, Copeia (M. Graham Netting, Carnegie Museum, Pittsburgh, Pa. 75 cents a copy), 1940(3), November, pp. 169-172.

Annotated list of 24 species and subspecies. Bibliography of 7 titles.

Natural History: Turtles of Minnesota

Breckenridge, W. J. Minnesota turtles, Conservation Volunteer (Minnesota Dept. of Conservation, St. Paul), 2(7), April 1941, pp. 11-16, 6 figs.

Illustrated key to 8 species; notes on their food habits and other life history.

Natural History: Vertebrate

Anon. American wild life (compiled by the Writers' Program of the Work Projects Administration in the City of New York) (Wise & Co., Inc., New York, N. Y. $4.50 a copy), xiv+749 pp., 6 col. pls., 327 photos, 1940.

A compilation of the popular natural history type that has benefitted by the contribution of much illustrative material and by the technical advice of numerous authorities. Brief accounts, well balanced as to description, natural history, and news interest, are given for representative species of the vertebrates of North America. The illustrations, of much diversity as to type and source, are adequate. The ample index is a guide to text and illustrations, and to pronunciation of animal names.

Propagation: Bob-white

Brill, Charles J. Down comes the cost of quail production, Southern Sportsman (Stock Bldg., Austin, Texas. 10 cents a copy), 5(9), April 1941, pp. 9, 19, 3 phptos.

Account of experience in Oklahoma in the improvement by selection of egg production and adult quality, while at the same time the cost of production was brought down to 70 cents per bird. This breeder believes that the figure can be reduced still further, probably to 50 cents.

Propagation: Hatchability and temperature

English, P. F. Hatchability of pheasant eggs in relation to some known temperatures, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 213-215, 5 tables.

Author's abstract: "During the course of a study entitled 'Causes of mortality of ring-necked pheasants in Michigan,' 500 pheasant eggs were divided into 16 lots and subjected to the following temperatures preparatory to hatching: 10, 16, 31, 68, and 85° F., and storage temperature (at which a check lot of 50 eggs was held). There were 3 lots of 30 eggs in each temperature class. One lot in each class was exposed once; another, twice; and the third, three times. The eggs were marked, mixed, and set at the game farm. Hatching results were observed. No appreciable difference in the hatch of any group was noted. Apparently temperature is seldom a cause of hatching failure."

Research: Cover values

Baker, Maurice F. Age classes of winter cover used by the eastern bob-white, Colinus v. virginianus, in southern Iowa, Iowa State College (Ames) Journ. Sci., 15(1), Oct. 1940, pp. 3-11, 1 pl.

A two-year study of winter survival of quail in coverts that were classed according to the ages of trees in them. Part of author's summary: "From the data obtained it appeared that any age class of covert might be adequate for quail in winter if other factors are favorable, but that those coverts above the 24-28 year age class have a definitely greater use for quail. Over the two year period 75 per cent of the vacant coverts occurred in coverts below the average age class. The average number of quail in the younger group was 11.2 and the older group 14.8."

It would seem more to the point if the study had dealt with the age of the ground cover, or at least with correlation of its stage of succession with that of the trees. Bibliography of 6 titles.

Research: Irradiation

Wolfson, Albert. Light versus activity in the regulation of the sexual cycles of birds: The role of the hypothalamus, Condor (W. Lee Chambers, 2068 Escarpa Drive, Eagle Rock, Calif. 50 cents a copy), 43(3), May-June 1941, pp. 125-136.

Those who wish to follow this subject, which has been treated in WILDLIFE REVIEW chiefly in relation to pen propagation, will find in this article a discussion of the essential literature (20 titles cited) on the role of light versus activity in advancing the sexual cycle. Part of author's conclusions: "It does not seem probable that daylight increasing 2 to 3 minutes a day under natural conditions penetrates the tissues of the head to stimulate the hypothalamus and pituitary. Light is an important factor in the regulation of the sexual cycle, but only in so far as it provides a stimulus for wakefulness. Since the wakefulness is under the control of the hypothalamus, the hypothalamus becomes the important timing center for the sexual cycle. x x x The hypothalamus, on the basis of recent work, seems to be that part of the nervous system which regulates the time of breeding and of migration. It is the integrator of the impulses concerned with the sexual cycle such as auditory, visual, tactile, and proprioceptive. In some species several of these impulses are important, while in others only one may be important. It has been shown in several instances that the sexual cycles of tropical birds and mammals cannot be manipulated experimentally with light. Yet, there is probably some factor in the environment which influences a timing center in the nervous system. The hypothalamus is probably involved in most species of birds and mammals and perhaps in other groups."

Research: Live trap

Blair, W. Frank. A simple and effective live trap for small mammals, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 191-193, 1 fig.

Author's abstract: "An effective but easily built live trap for small mammals has been used by the Laboratory of Vertebrate Genetics for the last four years. Instructions for building this trap are given, with illustrations and a detailed bill of materials."

Research: Mammal populations

Blair, W. Frank. Techniques for the study of mammal populations, Journ. Mammalogy (Wm. B. Davis, College Station, Tex. $1.00 a copy), 22(2), May 1941, pp. 148-157, 2 figs.

Discussion of selection of study area, size of plots, spacing of traps, baits and nesting material, trapping routine, removing small mammals from the traps, methods of marking, mortality in the traps, trapping records, and calculating areas of home ranges and populations per unit area. Bibliography of 12 titles.

Research: Need of

Ashbrook, Frank G. The need for research in fur animal production, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 139-140.

Author's abstract: "The annual take of raw furs is worth about $50,000,000 and the annual retail turnover is $300,000,000. The United States imports more furs than it produces. Fur animals should be given a prominent position in State and Federal administration of wildlife. A comprehensive program of research is necessary to place fur animals on a comparable basis with other wildlife resources. Such a program should include embryology, genetics, nutrition, and the experimental work should be conducted by competent scientists in public institutions.

Research: Rodent dens

Hedges, R. Frank. A method for determining extent of rodent dens, Journ. Wildlife Management (Frank C. Edminster, Soil Conservation Service, Upper Darby, Pa. 75 cents a copy), 5(2), April 1941, pp. 129-130, 1 fig.

Author's abstract: "Extent of rodent dens in earth dams is determined by forcing smoke from an automobile exhaust through the burrows. Since the normal exhaust of an automobile does not provide sufficient smoke, a smoke-producing agent must be added to the motor fuel. Kerosene was used with excellent results, being added by attaching a small rubber tube to the windshield-wiper coupling on the intake manifold and submerging the free end of the tube in kerosene. The smoke from the automobile exhaust is conducted to the burrow entrance through a garden hose, which is connected to the exhaust pipe by an inexpensive adapter. The adaptor is made of a 14-inch length of rubber connection-hose which is large enough to fit over the end of the garden hose and the end of the exhaust pipe. The two joints are secured by hose-connection clamps. This method was used in investigating the burrows of kangaroo rats, but it is believed that it will work as well on the burrows of other rodents."

Research: Sampling vegetation

Canfield, R. H. Application of the line interception method in sampling range vegetation, Journ. Forestry (Mills Bldg.; Washington, D. C. 50 cents a copy), 39(4), April 1941, pp. 388-394, 3 figs., 1 table.

Author's abstract: "The line interception method as herein described is designed for measuring density and composition of herbaceous vegetation and shrubs. It is based primarily on the line transect. However, it incorporates a new technique for obtaining an inventory of the vegetation by line measurement of individual plants on a randomly selected sample. It appears to offer a practical, rapid and statistically sound means for sampling vegetation on both large and small range areas, as well as on small plots used in detailed and intensive studies. Field tests have demonstrated that subjective influences are largely eliminated as factors affecting inventories so obtained. The method while primarily developed for range studies should also serve equally well to measure minor vegetation and stands of reproduction in forests."

Research: Scat identification

Webb, John. Identification of rodents and rabbits by their fecal pellets, Trans. Kansas Acad. Sci. (Roger C. Smith, Sec'y., Manhattan), 43, 1940, pp. 479-481, 1 fig.

Key to, and descriptions and figures of, fecal pellets of 15 genera.

Research: Seed identification

Plitt, Thora M. Seed impressions on plastic films, Plant Physiology (N. Queen St. and McGovern Ave., Lancaster, Pa. $2.50 a copy), 16(2), April 1941, pp. 422-424, Pl. 5.

Extension of the method of study developed for hairs (see WILDLIFE REVIEW, No. 30, March 1941, p. 39) to the sculpturing of seeds. Directions, samples of results.

Research: Trapping, Geomys

Sherman, H. B. A box trap for the capture of live Geomys, Journ. Mammalogy (Wm. B. Davis, College Station, Tex. $1.00 a copy), 22(2), May 1941, pp. 182-184, 3 figs.

Description and illustration of the trap and a shipping container.

WILDLIFE LEAFLETS

Issues of interest to wildlife managers additional to those previously mentioned are listed below. Copies of these mimeographed leaflets can be obtained from the Fish and Wildlife Service, U. S. Department of the Interior, Washington, D. C.

179. National wildlife refuges administered by the Fish and Wildlife Service, 8 pp., March 1941.

Tabulation arranged by States and Territories giving the name, location, date of establishment, and acreage of the refuges, and notes on the principal species they protect. The total number is 267 and acreage, 13,740,304.

180. Aids for bird study, 9 pp., March 1941.

A bibliography of available official publications on birds and also of commercially published books on identification, distribution, and habits of birds, and on the special subjects of bird-banding, economic ornithology, game birds and game management, flight, life history, migration, oology, photography, song, taxidermy, and territorialism. Names and places of publication of ornithological magazines also are given and the addresses of sources of educational leaflets, colored pictures, and charts, bird lectures, lantern slides and motion pictures, field glasses, telescopes, and taxidermist's and naturalist's supplies. The names of the principal ornithological societies and the addresses of officers also are provided.

181. The control of skunks, by Dorr D. Green and Ernest M. Mills, 4 pp., March 1941.

Habits, nuisance and damage attributable to skunks, and signs of their presence. Skunks are mostly beneficial to man but in special circumstances require control. Directions are given for trapping and disposal of the animals.

182. Some publications of interest to upland game bird breeders, 7 pp., March 1941.

Bibliography of available official documents and of other pertinent books, pamphlets, and periodicals, both American and foreign.

183. Some publications of interest to waterfowl breeders, 4 pp., March 1941.

Bibliography of available official documents and of other pertinent books and periodicals, both American and foreign.

185. The preparation of blood smears and tissue impressions for laboratory study, by Don R. Coburn, 2 pp., 1 pl., April 1941.

Directions for, and illustrations of, an approved method.

186. Available publications on wildlife, 9 pp., April 1941.

Latest revision of the list of available publications of the Fish and Wildlife Service, excluding those relating to fishes. Instructions for obtaining them.

190. Directions for destroying crawfishes, 2 pp., May 1941.

Directions for fumigating burrows with carbon disulfide and treating them with a coal-tar and creosote cattle dip.

NOTES AND NEWS

The first issue of the Pittman-Robertson Quarterly has appeared. Though dated January 1941, it was not available for distribution until June. It is a processed publication of the U. S. Fish and Wildlife Service devoted to the work of Federal Aid to the States in Wildlife Restoration. The leaflet in hand contains two special articles that are abstracted in preceding pages, a list of approved new projects by States, abstracts of quarterly reports upon State activities in the program, and miscellaneous notes.

Hemp seeds are valuable as food for certain animals both captive and wild, but the supply is likely to decrease under the campaign being waged against hemp on account of its use as a narcotic. Those desiring information on Federal law relating to this plant should apply to the Opium Research Committee, 1200 National Press Bldg., Washington, D. C., for its booklet, "Marihuana. A new dangerous drug" (48 pp., illus., March 1938). This brochure describes and illustrates the hemp plant and its seeds, gives its history as a drug, cites international restrictions on traffic in it, discusses Usonian legislation concerning it, and tells how the plant and its products may be identified.

A publication of the Marin Conservation League (76 Madrone Ave., San Anselmo, Calif.), entitled "Exploring Marin" (16 pp., illus., by Sally Carrighar) is unusual in calling attention to botanical and zoological, as well as historical, features of interest to tourists.

The Conservation Commission, State of Missouri (Jefferson City), has issued in mimeographed form 7 pages of details as to the Macon County hawk and owl investigation, a brief report upon which was noticed in WILDLIFE REVIEW, No. 30, March 1941, pp. 18-19.

SPECIAL ARTICLE

Groups of economic plants valuable for wildlife utilization and erosion control

This compilation deals with the plant groups treated in U. S. Department of Agriculture Circular 412 (11 pp., 7 pls., 1936), to the title of which the single word "economic" has been added to form the above heading.

The first draft was prepared at the instigation of the Division of Federal Aid in Wildlife Restoration, with the thought that farmers might be more readily interested in wildlife and erosion control plantings if the species recommended had some direct value to man.

That idea is appealing but it has a drawback. If too much emphasis is put upon values that can be realized only by removal of part or all of certain plants, the purpose of the wildlife plantings may be, in part, defeated. In consuming things supposedly planted for it, wildlife would then come to be regarded as a competitor with the farmer and would be, correspondingly, condemned. If a reasonable attitude is taken, however, this clash may be avoided. It would be well to omit from wildlife plantings in which the economic appeal is involved, species of importance for livestock browsing or grazing as well as those usually grown as crops.

It can do no harm to point out the value of all wildlife plantings in increasing the attractiveness of the farm, not only for the resident family but for paying boarders if any are taken. It should not be forgotten, moreover, that many products of wildlife plantings, even if not marketed, have a distinct value in the economy of the farm. Among them are greens; medicinal herbs; fruits used fresh or made into preserves and jellies, or in the preparation of wines or other drinks; and wood for posts, poles, lumber, wedges, levers, and fuel. The practical values of hedges, windbreaks, and erosion control plantings also are great.

The plant groups listed below are in systematic order. Abbreviations signify the lists in Circular 412 in which the group is included: C (cover), B (browse), H (herbage), M (mast), F (fruit), and S (seed). Indications of economic value are given at somewhat greater length. Completeness can not be hoped for, as the subject is practically inexhaustible.

Annotated Systematic List

Woodfern (Dryopteris).--H.
D. filix-mas and D. marginalis (male ferns), northern States, rootstocks medicinal.

Bracken (Pteridium).--H.
General, young shoots used for greens, and rootstocks eaten cooked or ground and made into bread.

Pine (Pinus).--C, B, S.
General, lumber, pulp, fuel, Christmas trees; turpentine, rosin, tar in the Southeast. Pinons (P. edulis, P. cembroides, and P. monophylla), southwestern States, P. lambertiana and P. sabiniana), California, demand for the "nuts" is greater than the supply. Eastern white pine (P. strobus), northeastern States, inner bark medicinal.

Larch (Larix).--B.
North, fence posts, poles, ties, fuel; tamarack (L. americana), northeastern States, inner bark medicinal.

Spruce (Picea).--C, B, S.
North and mountains, lumber, poles, masts, pulp, Christmas trees. Black spruce (P. mariana), northeast, spruce gum; this species and the red spruce (P. rubra) yield the twigs used in making spruce beer.

Hemlock (Tsuga).--C, B, S.
North and mountains, lumber, pulp, tanbark. Northern hemlock (T. canadensis), northeastern States, inner bark and resin medicinal; twigs used for tea.

Douglas fir (Pseudotsuga taxifolia).--C, B.
Northwest, lumber, masts; twigs used for tea.

Fir (Abies).--C, B, S.
North and mountains, lumber, pulp, Christmas trees. Balsam-fir (A. balsamea), northeastern States, Canada balsam, "spruce" gum, inner bark and resin medicinal.

Arborvitae (Thuja).--C, B.
North and mountains, posts, poles, shingles. American arborvitae (T. occidentalis), northeastern States, Christmas sprays; branchlets medicinal.

White cedar (Chamaecyparis).--C, B.
Northeast and northwest, lumber, posts, poles, ties, shingles.

Juniper (Juniperus).--C, B, F.
General, posts, pencil wood, cabinet material, Christmas trees. Common juniper (J. communis), northern States, berries for medicinal and flavoring purposes; distillation for volatile oil.

Joint-fir (Ephedra).--B.
Southwest, several species, plants medicinal, also used for tea.

Beardgrass (Andropogon).--S
Prairie beardgrass (A. scoparius) and bluejoint turkeyfoot (A. furcatus), eastern Great Plains, and silver beardgrass (A. saccharoides), Texas, wild hay.

Switchgrass (Panicum).--H, S.
P. virgatum, Kansas to Texas, wild hay.

Canary grass (Phalaris).--S.
Reed canary grass (P. arundinacea), northern Mississippi Valley, marsh hay.

Needlegrass (Stipa).--H, S.
Needle-and-thread (S. comata), northern Great Plains, wild hay.

Wheatgrass (Agropyron).--H.
Couch grass (A. repens), northern States, rootstocks medicinal. Bluestem (A. smithii), northern Great Plains, wild hay.

Nutgrass (Cyperus).--S.
Chufa (C. esculentus), general, tubers in some demand.

Sedge (Carex).--H, S.
C. stricta, eastern U. S., packing material.

Palmetto (Sabal).--F.
Extreme southeast, honey plants.

Scrub palmetto (Serenoa).--C, F.
Southeast, honey plants, berries medicinal.

Spanish moss (Tillandsia).--B.
Southeast, mattress stuffing, packing material.

Rush (Juncus).--H.
Common rush (J. effusus), general, mats.

Greenbrier (Smilax).--C, B, F.
Eastern half U. S. and Pacific States. Roots, the source of brier-wood for pipes; those of several species are medicinal.

Walnut (Juglans).--M.
Buttermut (J. cinerea), northeastern U. S.; nuts; leaves and bark of the root medicinal. Black walnut (J. nigra), eastern U. S., lumber, veneer, furniture, gunstocks, nuts extensively marketed. The hulls of both of these nuts are sources of dye.

Hickory (Hicoria).--B, M.
Eastern half U. S., lumber; basket, handle, and wheel stock; nuts, the latter marketed to some extent.

Waxmyrtle (Myrica).--B, M.
Mostly near coasts, bark, berries, and leaves medicinal; wax covering of the berries made into candles. Sweet gale (M. gale), north, leaves used as a condiment and for tea.

Sweetfern (Comptonia peregrina).--C, B.
Northeast, plant medicinal.

Poplar (Populus).--B.
General, aspen type, boxwood, excelsior, pulp, good source of pollen for bees. American aspen (P. tremuloides), northern States, bark medicinal. Cottonwood type, lumber, boxwood, cooperage, excelsior. Balm-of-gilead (P. candicans), northeastern States, buds medicinal.

Willow (Salix).--C, B.
White willow (S. alba), northeast, poles, posts, fuel. Black willow (S. nigra), general, cooperage, excelsior, pulp, charcoal, fuel; bark and fresh aments medicinal. Purple willow (S. purpurea), northeast, basketry. Willows in general are good sources of nectar and pollen for bees.

Blue beech (Carpinus caroliniana).--B, S.
Eastern half U. S., posts, handles, levers, wedges, fuel.

Hophornbeam (Ostrya virginiana).--B, S.
Eastern half U. S., posts, handles, levers, wedges, fuel; inner bark medicinal.

Hazel (Corylus).--C, B, M.
Eastern half U. S., northwest coast, nuts.

Birch (Betula).--C, B, S.
General, lumber, cooperage, handle stock, turnery, small wares, pulp, fuel. Black birch (B. lenta), northeastern U. S., furniture, woodenware, fuel; distillation for a volatile oil; bark medicinal; twigs used for tea. Yellow birch (B. lutea), northeastern States, furniture, flooring, interior finish, veneer.

Alder (Alnus).--C, B, S.
Hazel alder (A. rugosa), eastern U. S., bark medicinal. Western species: cabinet wood, fuel.

Beech (Fagus grandifolia).--B, M.
Eastern U. S., lumber, handle and cooperage stock, veneer, fuel; nuts sometimes marketed where plentiful.

Chinquapin (Castanea pumila).--B, M.
Nuts; bark medicinal.

Giant chinquapin (Castanopsis chrysophylla).--M.
Pacific States, lumber, nuts.

Oak (Quercus).--C, B, M.
General; the oaks supply much mast for hog food, certain species produce acorns edible by man, and oaks in general serve as good sources of pollen for bees. The white oak species are of value for lumber, cooperage, handle and wagon stock, furniture, veneer, poles, posts, mine props, ties, fuel, and tanbark. The inner bark of the true white oak (Q. alba), eastern U. S., is medicinal. The red oaks also are in demand for lumber, veneer, poles, posts, mine props, ties, fuel, and tanbark. Bark of the black oak (Q. velutina) yields the yellow dye, quercitron. The live oak (Q. virginiana), southeast, is reported to be a good honey plant.

Elm (Ulmus).--B.
White elm (U. americanus), eastern U. S., lumber, cooperage, handles, hubs; honey plant. Slippery elm (U. fulva), eastern U. S., cooperage, posts; inner bark medicinal.

Hackberry (Celtis).--B, F.
General, honey plants; fruit edible. C. occidentalis, eastern U. S., box wood, cooperage, fencing, cheap furniture.

Mulberry (Morus).--F.
General, cooperage, poles, posts, ties, fruit.

Osage orange (Toxylon pomiferum).--C, F.
Southern Great Plains, but widely transplanted; bows, hubs, poles, posts, treenails; yellow dye.

Wild buckwheat (Eriogonum).--B, H, S.
E. fasciculatum, California, honey plant. E. inflatum, southwest, stems eaten raw and pickled.

Dock (Rumex).--H, S.
General, potherbs; roots medicinal. Canaigre (R. hymenosepalus), southwest, tannin.

Smartweed (Polygonum).--H, S.
Heartweed (P. persicaria), general, potherb, salad, honey plant; some of the species as P. virginianum, eastern half U. S., P. hydropiper and P. punctatum, general, are medicinal.

Goosefoot (Chenopodium).--H.
Lambsquarters (C. album), general, potherb; other species also sometimes so used. Mexican tea (C. ambrosioides), general, medicinal.

Strawberry-spinach (Blitum capitatum).--H.
Northern half U. S., potherb.

Glasswort (Salicornia).--H.
Saline soils, stems used for pickles.

Greasewood (Sarcobatus).--B.
Southwest, tender twigs and leaves used for greens.

Russian thistle (Salsola).--H, S.
North, young shoots used for greens.

Redroot (Amaranthus).--S.
General, potherbs.

Pokeberry (Phytolacca americana).--F.
Eastern U. S., rootstocks and berries medicinal; young shoots used for greens.

Indian lettuce (Montia).--S.
M. perfoliata, Pacific coast and southwest, potherb.

Purslane (Portulaca).--H, S.
P. grandiflora, Texas, honey plant. P. oleracea, general, potherb, medicinal.

Common chickweed (Alsine media).--H, S.
General, potherb.

Magnolia (Magnolia).--S.
Eastern half U. S., lumber, excelsior, veneer; bark medicinal; honey plants.

Tuliptree (Liriodendron tulipifera).--S.
Eastern U. S., lumber, excelsior, veneer; bark medicinal; honey plant.

Wild columbine (Aquilegia canadensis).--H.
Eastern half U. S., medicinal.

Moonseed (Menispermum canadense).--F.
Eastern U. S., roots medicinal.

Bay (Persea).--F.
Red bay (P. borbonia), southeast, lumber, cabinet work; distillation for volatile oil; leaves used as a condiment.

California laurel (Umbellularia californica).--F.
Western Oregon and California, cabinet and trim wood; leaves medicinal, also employed as a condiment.

Sassafras (Sassafras sassafras).--B, F.
Eastern half U. S., posts, rails, cooperage, fuel; pith medicinal; bark of the roots medicinal, also used for flavoring and for tea; distillation for volatile oil; leaves used as a condiment.

Spicebush (Benzoin).--F.
Eastern half U. S., bark medicinal; twigs used for tea, fruits as a condiment.

Mustard (Brassica).--H, S.
Black mustard (B. nigra), general; seeds medicinal and condimental; distillation for volatile oil; honey plant.

Shepherd's purse (Bursa bursa-pastoris).--S.
General, potherb, salad, medicinal.

Sweet gum (Liquidambar styraciflua).--S.
Southeastern third U. S., yields a balsamic gum; bark medicinal.

Witch-hazel (Hamamelis virginiana).--B.
Eastern U. S., leaves, bark, and twigs medicinal; distillation for volatile oil.

Sycamore (Platanus).--B.
General, lumber, butcher blocks, box wood, cooperage, veneer.

Hawthorn (Crataegus).--C, B, F.
General, honey plants; fruits used locally; that of the mayhaw (C. aestivalis), southeast, and river hawthorn (C. rivularis), northwest, extensively employed for making jelly.

Mountain-ash (Sorbus).--B, F.
American mountain-ash (S. americana), northeastern States, bark and berries medicinal.

Toyon (Heteromeles arbutifolia).--F.
California, Christmas sprays; honey plant; fruit edible.

Serviceberry (Amelanchier).--B, F.
General, the berries are marketed locally in northern States.

Blackberry and raspberry (Rubus).--C, B, F.
General, bark of the root medicinal; fruits used for food and for medicinal and flavoring purposes; honey plants.

Strawberry (Fragaria).--H, F.
General, fruits of wild plants everywhere eaten and in some places gathered and marketed.

Cinquefoil (Potentilla).--H.
Silverweed (P. anserina), north, leaves medicinal, roots edible.

Plum (Prunus).--C, F.
General, honey plants; fruits used both fresh and preserved. Beach plum P. maritima), northeast coast, fruit of local commercial importance.

Catclaw (Acacia).--C, B, S.
A. greggii, southwest, lac; honey plant.

Mesquite (Prosopis).--C, B.
Southwest, honey plants; pods cooked and eaten when green, and when ripe used for meal and bread.

Screwbean (Strombocarpa).--H.
Southwest, pods eaten fresh and when made into meal and cakes; also used in the preparation of a drink and of a crude molasses.

Redbud (Cercis).--B.
General, except northwest, honey plants.

Senna (Cassia).--S.
C. marilandica, northeastern States, leaves medicinal. C. occidentalis, southeast, seeds used as a substitute for coffee.

Partridge pea (Chamaecrista).--C, S.
C. fasciculata, eastern U. S., honey plant.

Ratany (Krameria).--B.
Southern border, roots medicinal.

Honeylocust (Gleditsia).--B, S.
G. triacanthos, eastern U. S., poles, posts, mine props, ties; honey plant.

Jerusalem thorn (Parkinsonia).--B.
Southwest, honey plants; bark medicinal.

Bur-clover (Medicago).--H, S.
M. denticulata, California, honey plant.

Sweetclover (Melilotus).--S.
General, honey plants; flowers medicinal.

Clover (Trifolium).--H, S.
General, honey plants; flowers medicinal.

Birdsfoot trefoil (Lotus).--H.
Deerweed (L. scoparius), California, honey plant.

Locust (Robinia).--C, B, S.
Black locust (R. pseudoacacia), eastern U. S., masts, poles, posts, mine props, ties; honey plant; root bark medicinal.

Sesbania (Sesban).--S.
S. macrocarpa, southeast, yields a strong fiber.

Pencil flower (Stylosanthes).--S.
S. biflora, eastern half U. S., medicinal.

Hogpeanut (Amphicarpa).--H, S.
Eastern half U. S., seeds from the underground pods edible.

Geranium (Geranium).--H, S.
Cranesbill (G. maculatum), eastern U. S., and herb Robert (G. robertianum), northeastern fourth U. S., roots medicinal.

Alfilaria (Erodium).--H, S.
Most abundant in the West, honey plants; medicinal.

Wood sorrel (Oxalis).--H.
Eastern half U. S., salad, medicinal.

Prickly-ash (Zanthoxylum).--C.
Eastern half U. S., honey plants; bark and berries medicinal.

Chinaberry (Melia azedarach).--F.
Southern U. S., honey plant; bark medicinal.

Turkey mullein (Eremocarpus setigerus).--S.
California, medicinal.

Queen's delight (Stillingia sylvatica).--S.
Southeastern States, roots medicinal.

Jojoba (Simmondsia californica).--C.
Southwest, seeds edible raw and used cooked as a substitute for chocolate.

Peppertree (Schinus molle).--F.
California, honey plant.

Sumac (Rhus).--C, E, F.
General, honey plants; source of tannin. Leaves, bark, and berries of several species medicinal; fruits of various species used in making sour drinks.

Holly (Ilex).--C, F.
Eastern half U. S., several evergreen species used for Christmas decorations; apparently all are good honey plants. American holly (I. opaca), eastern U. S., wood good for turnery; leaves and fruit medicinal. Youpon (I. vomitoria) and dahoon (I. cassine), southeast, inkberry (I. glabra), Atlantic States, and winterberry (I. verticillata), eastern half U. S., leaves used for tea; bark and berries of the last-named medicinal.

Burningbush (Euonymus).--S.
Wahoo (E. atropurpureus), eastern U. S., bark medicinal.

Bittersweet (Celastrus scandens).--C, S.
Northeastern fourth U. S., Christmas decorations, bark medicinal.

Maple (Acer).--B, S.
General, honey plants. Hard maples (A. saccharum, nigrum, drummondi, and macrophyllum) yield high quality lumber that is used for furniture, flooring, veneer, cooperage, and handle stock, also for fuel; maple sugar is largely the yield of the first of these species. Soft maples (A. saccharinum, rubrum, and carolinianum) yield a lower grade but still extensively used lumber that is made into cheap furniture, flooring, and woodenware.

Jewel-wood (Impatiens).--H, S.
Eastern half U. S., pothorb, medicinal.

Squawbush (Condalia).--F.
Southwest, honey plants.

Supplejack (Berchemia scandens).--F.
Southeast, honey plant.

Jersey tea (Ceanothus americanus).--C, B, S.
Eastern U. S., leaves used for tea; bark, leaves, and roots medicinal.

Wild grape (Vitis).--C, B, F.
General, honey plants but even more valuable as a source of pollen for bees; fruits used locally fresh, and for jelly and wine.

Virginia creeper (Parthenocissus quinquefolia).--C, F.
Eastern half U. S., bark medicinal.

Treebine (Cissus).--F.
Southeastern quarter U. S., honey plants.

Basswood (Tilia).--B.
Eastern half U. S., lumber, excelsior, veneer, cooperage, drawing boards, woodenware; honey plants. American linden (T. americana), eastern U. S., flowers medicinal.

Mallow (Malva rotundifolia).--S.
General, potherb.

Saltcedar (Tamarix).--C.
Southwest, fuel.

Violet (Viola).--S.
Bird's-foot violet (V. pedata), eastern half U. S., medicinal.

Passionflower (Passiflora).--F
Maypop (P. incarnata), southeast, stem-base and roots medicinal; fruit used fresh and in jelly.

Pricklypear (Opuntia).--C, B, F.
General, honey plants; fruits (tunas) of some of the southwestern species are locally marketed.

Daphne (Daphne mezereum).--F.
Northeast, bark medicinal; fruit used as a condiment.

Leatherwood (Dirca).--F.
Eastern half U. S. and California, bark medicinal; also used for withes.

Silver buffaloberry (Lepargyrea argentea).--C, B, F.
Northwest, berries edible and much used for jelly.

Elaeagnus (Elaeagnus).--C, F.
Silver-berry (E. argentea), northwest, berries edible. Russian olive (E. angustifolia), introduced, general, honey plant.

Fireweed (Chamaenerion).--H.
C. angustifolium, northern States, potherb, honey plant.

Evening-primrose (Oenothera).--H, S.
O. biennis, eastern U. S., plant medicinal; root edible.

Aralia (Aralia).--F.
Eastern half U. S., bark and roots medicinal.

Lovage (Ligusticum).--H.
North and west, roots medicinal.

Angelica (Angelica).--B, H.
A. atropurpurea, northeastern States, and A. villosa, southeast, roots and seeds medicinal.

Cow parsnip (Heracleum lanatum).--H.
North and mountains, root and seeds medicinal.

Tupelo (Nyssa).--F.
Eastern U. S., honey plants. Sourgum (N. sylvatica), lumber used for crates, hubs, rollers, ties.

Dogwood (Cornus).--C, B, F.
General, bark of several species medicinal. Flowering dogwood (C. florida), eastern U. S., the wood is used for bobbins, handles, shuttles, and other turnery.

Shinleaf (Pyrola).--H.
North and mountains, medicinal.

Trailing arbutus (Epigaea repens).--B.
Northern and eastern States, leaves medicinal.

Wintergreen (Gaultheria).--C, B, F.
G. procumbens, northeastern fourth U. S., leaves medicinal; distilled for volatile oil; fruit edible, sometimes marketed. Salal (G. shallon), northwest, fruit edible.

Manzanita (Arctostaphylos).--C, B, F.
General except southeastern third U. S., honey plants, leaves medicinal; fruits used in the west for making jelly and refreshing drinks.

Huckleberry (Gaylussacia).--C, B, F.
Eastern half U. S., berries marketed locally.

Blueberry (Vaccinium).--C, B, F.
General, berries everywhere eaten raw or cooked and marketed on a large scale.

Bumelia (Bumelia).--F.
Southern half U. S., honey plants.

Persimmon (Diospyros).--F.
Eastern half U. S., honey plants. D. virginiana, eastern U. S., wood used for a few specialties as golf-club heads, shoe-lasts, and shuttles; fruit.

Ash (Fraxinus).--B, S.
General, bark and leaves medicinal. The more valuable species exemplified by the white ash (F. americana), eastern U. S., yield a high grade lumber that is used for furniture, interior trim, cooperage, handle stock, and woodenware; less valuable forms like the black ash (F. nigra) are used for hoops, baskets, and chair bottoms.

Fringetree (Chionanthus virginica).--F.
Southeastern fourth U. S., root bark medicinal.

Privet (Ligustrum).--F.
General in cultivation, honey plants.

Elkweed (Frasera).--H.
American columbo (F. carolinensis), northeast, medicinal.

Skunkweed (Polemonium).--H.
Greek valerian (P. reptans), northeastern quarter U. S., root medicinal.

Bluebells (Mertensia).--H.
M. virginica, northeastern quarter U. S., medicinal.

Puccoon (Lithospermum).--H, S.
General, roots yield a yellow dye.

Vervain (Verbena).--S.
General, honey plants. Blue vervain (V. hastata), general, medicinal. European vervain (V. officinalis), eastern half U. S., medicinal, leaves used for tea. White vervain (V. urticifolia), eastern half U. S., medicinal.

Lantana.
L. camara, Florida, leaves used for tea, also medicinal.

Lippia (Lippia).--S.
General, honey plants.

Bluecurls (Trichostema).--S.
T. lanceolatum of the Pacific Coast is an important honey plant. T. lanatum, California, medicinal.

Sage (Salvia).--C.
General, honey plants, especially the black (S. mellifera), and white (S. apiana), sages of California. The seeds of chia (S. columbariae), southwest, are used in preparing both food and drink.

Matrimony-vine (Lycium).--C, B.
L. andersonii, L. pallidum, southwest, fruit edible.

Speedwell (Veronica).--H.
V. officinalis, northeastern fourth U. S., leaves medicinal.

Desert willow (Chilopsis linearis).--C.
Southwest, posts.

Plantain (Plantago).--H.
General, medicinal.

Buttonbush (Cephalanthus occidentalis).--S.
General except northwest, honey plant; bark medicinal.

Partridgeberry (Mitchella repens).--H, F.
Eastern half U. S., medicinal; fruit edible.

Mexican clover (Richardia scabra).--H.
Southeast, root medicinal.

Buttonweed (Diodia).--S.
D. teres, eastern half U. S., honey plant.

Cleavers (Galium).--H, S.
G. aparine, eastern half U. S., and G. mollugo, northeastern quarter U.S., medicinal. G. tinctorium, northeastern two-thirds U. S., yields a red dye. G. verum, northeast, coagulates milk, medicinal.

Elder (Sambucus).--B, F.
S. canadensis, eastern half U. S., honey plant; bark, flowers, and fruits, medicinal; fruit used for pies, jelly, and wine; so also is that of S. glauca, northwest.

Black haw (Viburnum).--B, F.
General except southwest, bark medicinal. V. rufotomentosum of the southeastern States is reported to be a good honey plant. V. cassinoides, northeast, leaves used for tea. Fruits of several species edible.

Snowberry, coralberry (Symphoricarpos).--C, B, F.
General, honey plants.

Honeysuckle (Lonicera).--C, B, F.
General. The bush honeysuckles with short corollas are good honey plants; bearberry honeysuckle (L. involucrata), northwest, fruit edible.

Valerian (Valeriana).--H.
General, roots medicinal. V. edulis, northwest, roots baked and eaten.

Rabbitbrush (Chrysothamnus).--C, B.
C. nauseosus, southwest, honey plant.

Niggerhead (Rudbeckia).--H.
Green-headed cone-flower (R. laciniata), northeast half U. S., medicinal.

Wyethia.--H.
W. helenioides, California, medicinal.

Sunflower (Helianthus).--S.
General, honey plants; seeds edible. Jerusalem artichoke (H. tuberosus), tubers edible.

Helianthella.--H.
H. tenuifolia, Florida, medicinal.

Bur-marigold (Bidens).--S.
General, honey plants; roots and seeds medicinal.

Tarweed (Hemizonia).--S.
California, honey plants.

Yarrow (Achillea).--H.
General, plant medicinal.

Sagebrush (Artemisia).--C, B, H.
General, roots and leaves medicinal; distilled for volatile oil.

Arnica.--H.
General, roots and leaves medicinal.

Thistle (Cirsium).--H, S.
General, honey plants; roots of C. edulis and C. foliosum, northwest, edible.

Star-thistle (Centaurea).--H, S.
Napa thistle (C. melitensis), California, honey plant. Two introduced species, C. calcitrapa and C. nigra, are medicinal.

Dandelion (Taraxacum).--H, S.
Common dandelion (T. taraxacum), general, potherb, roots medicinal.

Sowthistle (Sonchus oleraceus).--S.
General, potherb.

Wild lettuce (Lactuca).--H, S.
Prickly lettuce (L. scariola), general, leaves medicinal; the juice of L. canadensis, general, L. hirsuta, eastern U. S., and L. sagittifolia, northeastern quarter U. S., is mildly narcotic; all of these are used as potherbs.

Hawkweed (Hieracium).--H.
H. gronovii, eastern half, and H. scabrum, northeastern quarter, U. S., are used for relief of toothache; and H. venosum, northeastern quarter U. S., is medicinal.

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